

THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—24TH YEAR.

SYDNEY, SATURDAY, OCTOBER 2, 1937.

No. 14.

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The Jackson Lecture.¹

GALEN, THE MEDICAL DICTATOR: HIS LIFE AND INFLUENCE ON THE PROGRESS OF MEDICINE.

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Sydney.

Six years ago I read in THE MEDICAL JOURNAL OF AUSTRALIA that an annual lecture on the history of medicine had been established in Brisbane to mark the appreciation of the valuable services rendered to the Queensland Branch of the British Medical Association by Dr. Sandford Jackson. At last, I thought, the medical profession in Australia has

awakened to the value and interest of the study of medical history. Too long the wonderful story of the achievements of the great men who have adorned our medical past had remained unstudied and neglected except by a few medical scholars. The average medical man was too busy in the turmoil of practice and too busy keeping up to date with modern discoveries to think about the past. Thus was developed a false superiority complex. Being ignorant of the attainments of our ancestors, we wasted much time and labour in rediscovering much that had been revealed in the past and then forgotten. Medical history abounds in such instances, and, as we shall see in the case of Galen, excellent scientific experimental work was lost sight of for 1,600 years.

The six years which have elapsed since the foundation of this lecture have witnessed a great awakening of interest in the study of the history of medicine, not only in Australia, but throughout the

¹ Read at a meeting of the Queensland Branch of the British Medical Association on August 6, 1937.

world; the Queensland Branch is to be congratulated on leading the way in Australia. The establishment of lectures such as this will lead to a better understanding of the difficulties which our medical forerunners had to face and to a more generous appreciation of their successes. Do not forget that there were famous medical men before Koch and Lister. From their failures we may also learn valuable lessons if only we learn not to repeat their mistakes. That wise and great writer, Carlyle, tells us in one of his historical books that "history is philosophy teaching by examples", and if you study your medical history carefully you will find many examples from which much may be learned.

When I read of the foundation of this lecture I dreamed that perhaps at some future date I might be invited to give one of the lectures; now tonight my dreams have come true, and I find myself about to deliver the seventh Sandford Jackson Lecture.

Having gratefully accepted the invitation to lecture to you, I was next faced with the question, what was to be my subject? The history of our profession, extending back through thousands of years to the beginnings of human life, presents so many aspects of interest and so many phases in which it has touched every side of human endeavour, and so many famous men are included in its honour roll, that the choice was difficult. In my library I have treasured reprints of the previous Jackson Lectures, and as I looked through their pages I found that there was one written by a member of our profession who was an accomplished classical scholar. This man was Eric Jeffrey. In spite of years of ill-health, Jeffrey set his colleagues an example by his love of learning, which rendered him worthy to take his place with the great English medical scholars, Francis Adams, Norman Moore and Clifford Allbutt. Francis Adams, a country practitioner in Scotland, passed the weary hours of waiting in the cottage for the arrival of the expected baby by translating the works of Hippocrates from their native Greek into English; at the other extreme of the medical profession are Norman Moore, one time President of the Royal College of Physicians, and Clifford Allbutt, Regius Professor of Medicine at Cambridge, both of whom, in spite of large consulting practices, were famous for their knowledge of the ancient classics.

In 1934, Jeffrey chose as his subject "The Ancient Romans Through Medical Eyes". In this lecture he told you the story of Roman medicine from the early days, in which figured those remarkable twins, Romulus and Remus, at which distant time Rome was a small village on the banks of the Tiber, down to the days of the amateur physician Celsus, who lived at the beginning of the Christian era, by which time the small village on the Tiber bank had grown into imperial Rome.

To this great city, in the year A.D. 162, there came from Pergamum, in Asia Minor, a young Greek medical practitioner, who was destined by his doctrines and teachings to hold the medical world in thrall for over 1,400 years. This man was Galen,

next to Hippocrates the greatest name in medical history and long known to countless medical men as the "Prince of Physicians". I thought that perhaps some account of this wonderful man would be interesting, since Galen may be said to have laid the foundations of scientific experimentation as a means of advancing the medical art. His true greatness is only now being fully realized after a long period of false adulation, followed by a short period in which his writings were totally neglected. Moreover, in talking about Galen, I should be carrying on the story of Roman medicine from the point where Dr. Jeffrey left off. I cannot claim any special knowledge of Galen's works, nor can I put forward any new discoveries in his writings, for my remarks tonight have been gathered from many authors and contain very little that can be called original. I shall quote as my excuse the words of the old physician and botanist, William Turner, the "Father of British Botany", who lived at the beginning of the sixteenth century. In the preface to his book he writes:

For some of you will saye, seynge that I graunte that I have gathered this discourse of so many writers, that I offer unto you an heape of other mennis laboures and nothings of myne owne. . . . To whom I aunswere, that if the honye that the bees gather out of so manye floure of herbes, shrubbes, and trees, that are growing in other mennis medowes, feldes and closes: may justelye be called the bees honye: . . . So maye I call it that I have learned and gathered of manye good autoures . . . my discourse.

The study of Galen is rendered particularly difficult by the fact that so few of his books have been translated into English. A complete edition, made by the French historian, Charles Daremberg, many years ago, exists in French; but in English the only work of Galen is the translation by Dr. Brock of the work "On the Natural Faculties" published in the Loeb Library.

The works of Galen that are still extant aggregate the enormous number of over two and a half million words, which is equivalent to four volumes the size of Osler's "Practice of Medicine". Few physicians or scholars in the present day can claim to have read through this vast collection, which is not helped by the fact that there are no chapter headings or other brief clues to the contents. You will understand that to give a complete account of Galen's activities in one lecture would be impossible, and I propose this evening to limit myself to a general account of his life and works, while endeavouring to give you a picture of the times in which he lived, and then to try to explain why Galen's name and doctrines held an undisputed sway over the medical world until the beginning of the sixteenth century, when Paracelsus attempted to overthrow his authority. In illustration of the reverence in which Galen was held, as late as 1559 we read of the case of John Geynes, an Oxford M.D., who was severely reprimanded by the authorities of the Royal College of Physicians "for impugning the infallibility of Galen. On his acknowledgement of error, and humble recantation, signed with his own hand, he was received into the College". Galen's authority

lasted on until the end of the seventeenth century, for we find Galen referred to as an authority in James's "Dictionary of Medicine", published in the middle years of that century.

Galen was born in A.D. 131 at Pergamum, in Asia Minor. The ancient city of Pergamum, founded in the early days of Greek civilization and situated about fifty miles north of the modern town of Smyrna, was one of the greatest cities of the time, and reached its greatest splendour about 190 B.C. under King Eumenes. Here was founded a great library which rivalled that of Alexandria. So jealous did the librarians of Alexandria become that they persuaded the authorities to prohibit the export of papyrus. Thus deprived of the substance which was the paper of the day and a substitute having to be found, the scribes of Pergamum invented from the skins of animals a substance which they called parchment, and which to this day in its name reminds us of its city of origin. The *charta pergamena*, later known as parchment, not only proved satisfactory, but gradually displaced papyrus.

After the library of Alexandria had been partly destroyed, Cleopatra asked Mark Antony to repair the loss by granting her the books of Pergamum. Only too willing to please his lady-love, Mark Antony transferred over two hundred thousand volumes to the rival library at Alexandria.

The great fame of Pergamum was always jealously regarded by imperial Rome, which brooked no rivals, and the last king of Pergamum, realizing that Rome would inevitably absorb the city, on his deathbed bequeathed his kingdom to the Roman Empire. His death took place just two hundred years before the birth of Galen, and thus, when our "Prince of Physicians" was born, Pergamum was the capital of the Roman province of Asia. Pergamum retained its prosperity during the first two centuries of the Christian era, for a Roman official at the time of Galen describes it as "preeminent above all other towns of Asia". Pergamum was famous for its gladiatorial shows, and as we shall see, these had a personal interest for Galen and were the means of starting him in practice.

Pergamum was a great medical centre, for it was the seat of an important temple dedicated to the god of healing; in this temple was a large statue of Æsculapius with the figure of a serpent, such as we see in most statues representing the god of medicine. Some of you may remember that if you open your Bibles at the Revelation of St. John the Divine, chapter II, verse 13, you will read as follows: "I know thy works and where thou dwellest, even where Satan's seat is"; and twenty chapters further on, verse 2, you will read of "that old Serpent which is the Devil and Satan". Pergamum and its temple are generally looked upon as being Satan's seat, and the "old Serpent" refers to the figure of the serpent of Æsculapius in its temple. Whether the city of Pergamum and its inhabitants

deserved this reputation more than the other cities of Asia Minor did, I do not know.

Galen was singularly fortunate in his father, Nikon. Nikon was an architect, an able and educated man, who possessed sound knowledge in mathematics, physics and the natural sciences. Galen was devoted to his father and never mentions him without reverence. In his mother he was not so fortunate. Let him tell us about his parents in his own words:

It was my rare good fortune to have a father who was most gentle, most just, most upright and most cultured, while my mother was so passionate and of so irritable a temper that she would at times bite her maids, and was for ever screaming and quarrelling with my father, worse than Xantippe with Socrates.

Nikon, who believed in the influence of names, called his son Galenos, which in the Greek means calm and peaceable; but, alas, as we shall see, this great physician inherited in some degree the choleric temperament of his mother.

Nikon superintended the education of his son and insisted that he should be instructed by distinguished teachers. This education began at the age of fourteen, when our embryo physician entered upon the study of philosophy. To avoid any narrowness of outlook, Galen studied in turn under Stoic and Platonic, Peripatetic and Epicurean masters, and so engrossing did these studies prove that Galen proposed to become a philosopher and abandon the study of medicine. However, Nikon had a dream in which Æsculapius appeared to him, and this dream was taken as a command to enrol his son as a student of medicine. In modern times many a father has enrolled his son in the faculty of medicine with less reason.

At this time Pergamum possessed an excellent medical school at which, among other famous teachers, was to be found the famous anatomist, Satyrus. Galen, as he tells us, seized every opportunity to observe interesting cases of disease; and even at this early stage of his education he was prone to criticize the diagnoses of his elders. The great numbers of pilgrims who visited the shrine of Æsculapius provided him with much clinical material, and among other cases he describes an epidemic of carbuncles and gives an accurate description of the anatomical structures laid bare by ulceration of the parts.

Four years passed, and Nikon was gathered to his fathers. Having fixed up his father's estate, Galen started out on his travels. His first journey took him to the near-by town of Smyrna.

Smyrna possessed at this time one of the greatest schools of medicine and mathematics, second only to those at Alexandria, and the greatest schools of philosophy and rhetoric with the exception of those at Athens. "All Ionia", says Philostratus, "is like a college of learned men, but Smyrna holds the highest place." Ionia included most of the coast of Asia Minor. Smyrna, as well as being one of the oldest cities, one of the reputed birthplaces of Homer, was the second seaport of the world, and every ship brought students from all over the known

world. There was a temple of Æsculapius on the waterfront overlooking the bay.

In his writings, Galen gives us numerous biographical details; in this he differs greatly from Hippocrates, who has left us few, if any, details about himself. From Galen's works we learn that he did much anatomical study under Pelops, the anatomist, who was famous for his work on the muscles. Pelops was also a leading physician; Galen, at the end of his life, declares that the theory of medicine learned from the Smyrniote physician never failed him. Galen tells us of an interesting case of a brain injury. He says:

We have seen wounds of the cerebrum often cured and once in Smyrna under our still living preceptor Pelops, a remarkable wound. In this case the wound penetrated one of the lateral ventricles yet the young man recovered. This is, of course, very rare, and it is true that large wounds such as Hippocrates calls cleaving usually bring about death, and when they penetrate a ventricle all concede them fatal.

So miraculous was this cure that Galen gave the credit to the intervention of a god rather than to the skill of the physician. We are told of various methods of treatment of epilepsy and rabies. The former disease was looked upon as caused by a poison which rose from the feet or hands up to the head, and as treatment it was advised to tie a ligature round the leg or arm in which the patient felt the aura, thus preventing the poison from spreading.

While at Smyrna, Galen carried out some physiological experiments on the action of the thoracic muscles and diaphragm on respiration, and he wrote a treatise on the movement of the lungs and thorax in which he detailed the work of his teachers, Satyrus and Pelops. Some seven years later he was to publish further experiments which laid the foundation of our modern knowledge of the action of the respiratory muscles. Let us learn of one more case before we leave Asia Minor and cross the blue Ægean to Corinth, a city notorious for a prosperity which was only matched by its profligacy.

Among the patients seen by Galen was the philosopher, Nicomachus, who had become so fat that he could not move. Put on a strict dietary by the priests of Æsculapius, he regained once again his schoolboy figure. While at Smyrna, Galen studied philosophy with the Platonist Albinus, and published a treatise on medical statements in the *Timæus* of Plato.

Of Galen's stay at Corinth we know very little; most probably it was short. After the departure of his teacher, Numesianus, for Alexandria, Galen paid a flying visit to Athens, and returned to his native town for business reasons, after which he, too, sailed for Alexandria and its famous schools.

Puschmann, the German medical historian, tells us that:

Alexandria was filled to overflowing with medical practitioners and there was probably no medical system, no method of treatment which had not its adherents and advocates amongst the doctors residing there. Nowhere could the student of medicine see and learn so much as in

Alexandria. On this account young doctors came there when they wished to perfect themselves in their specialities.

To have studied at Alexandria was the best recommendation a young doctor could have, and here, in A.D. 153, at the age of twenty-three years, Galen entered upon a course of study which lasted for five years, and which prepared him for triumphs that came to him when ultimately he practised in the Roman capital. A few words may be devoted to a short description of the famous school of Alexandria. The city was the second city of the Roman Empire, with a population of over 500,000, and the first commercial city of the world, having the greatest seaport and the largest industries. To the teachers of its schools we owe geometry, trigonometry, physics and astronomy, grammar and criticism, and many discoveries in medicine. Let me mention the names of a few of these famous men: Euclid, the father of geometry, who flourished about 450 years before the time of Galen, whose teachings had a great influence on Galen, who endeavoured to produce a medical science as logical as the geometry of Euclid. Archimedes, the physicist; it is in one of Galen's works that we find the well-known story of how Archimedes destroyed the enemy's ships by setting them on fire by means of the sun's rays and a magnifying glass. Claude Ptolemy, the geographer and astronomer contemporary with Galen, who lived between the years A.D. 90 and 168. Ptolemy worked in a suburb of Alexandria during the years in which Galen was visiting Alexandria. Ptolemy was a giant in intellect, with a general knowledge never surpassed. He knew that the earth was spherical, but believed it to be the centre of the universe. To him we owe the terms "longitude" and "latitude", and his works on geography, astronomy and the higher mathematics were the authorities for the next thirteen hundred years.

The name of the great anatomist, Herophilus, is familiar to all medical men who have studied the brain; he, with his colleague, Erasistratus, founded the medical school of Alexandria. These two, with Hippocrates, Galen calls the three greatest physicians of past times.

Herophilus was the first man to perform necropsies for the purpose of learning the nature and seat of disease; he was the first to recognize that the arteries contained blood. When we speak of the four phases of the heart's action, the systole, diastole and the pauses, we are indebted to Herophilus, who lived over two thousand years ago; Dioscorides, the greatest pharmacologist of antiquity, whose book Galen calls "the most perfect treatise on materia medica ever written"; Rufus of Ephesus, who first described the thymus gland; Soranus of Ephesus, the father of gynecology, who, if not the actual inventor of the speculum, was the first to use it scientifically; these all taught, and helped to make the school of Alexandria famous. Galen, apart from medicine, continued his studies in philosophy and astronomy and took all knowledge as his province.

At this time the philosophical schools had fallen into the hands of the Sophists, who were debating about words and allowing the most preposterous hypotheses to run away with them. "By the gods", Galen writes, "they taught such nonsense that I fell into Pyrrhonic doubt of all things except arithmetic and geometry." With regard to the medical teaching, Galen tells us that some of the teachers were excellent, but others, who had formed a sect called the methodologists, aroused his indignation, and he does not mince words in speaking of them:

In Alexandria the art of medicine was taught by ignoramuses in a sophistical fashion in long, illogical lectures to crowds of fourteen-year-old boys, who never go near the sick.

Distracted by the empty theories put forth by the rival sects, Galen sought for an axiomatic ground principle in connection with the cure of disease, and adopted the axiom of the school of Hippocrates: *Contraria contrariis curantur*; this formed the principle upon which he based his treatment of disease. Galen, however, did not rely on this alone, but taught that every theory should be proved by experiment: "The proof of correct treatment is based on two criteria, reason and experience." During the five years spent in Alexandria, Galen published papers or books aggregating 600,000 words, besides studying geometry, astronomy, philology, philosophy and, of course, medicine and surgery, so that his time was fully occupied. During this period he made preliminary studies which ultimately led to one of his greatest discoveries, the course and function of the recurrent laryngeal nerve.

An interesting sidelight on the history of the time is that we owe to Galen the story of the death of Queen Cleopatra through the bite of an asp; he tells us how he witnessed in Alexandria "the quick and humane manner of executing a condemned criminal by placing an asp on his breast and forcing him to walk about in order to urge its prompt action".

His five years of post-graduate study being accomplished, Galen retraced his steps to his native city, and on his return home received his first professional appointment, that of surgeon to the gladiators, which appointment he held for four years. As surgeon to the gladiators he dealt chiefly with surgery; he devised new methods, amongst others the use of wine in the dressing of severe wounds to allay inflammation. He also became expert in suturing severed tendons. In a treatise on the treatment of wounds, Galen tells us:

As I have previously explained, it is necessary to keep the wound continually moist, because if the dressings dry out, the ulcer becomes inflamed. I cured the most seriously injured by covering the wounds by a cloth wet with astringent wine kept moist both day and night by a superimposed sponge.

Here we have a forerunner of our modern method of continuous irrigation of septic wounds.

Galen's position as surgeon to the gladiators gave him a well-equipped operating theatre and sufficient

animals for him to dissect and experiment upon. When not occupied with his professional duties, he carried out much anatomical and physiological research work. He described the diaphragmatic muscle, its innervation, and what happens when one or both phrenic nerves are cut. He was the first to note the obliquity and decussation of the fibres of the intercostal muscles and to explain the reason therefor, namely, that one part was active in the expansion, the other in the contraction of the chest walls. He sectioned the nerves to the intercostals and watched the action of the diaphragm alone. Finally, he showed the influence of the thoracic muscles. These experiments on respiratory muscles led to the discovery of the nerve of speech, the recurrent laryngeal nerve. This discovery was accidental. One day, while experimenting on a pig in which he was sectioning one at a time the nerves entering the thorax to learn if this had an influence on breathing, he cut the recurrent laryngeal nerve, and to his amazement the pig, which was previously squealing, became silent. He repeated his experiment on domestic animals and on wild animals of the arena, such as the lion and even the long-necked crane and ostrich, always to find that their peculiar utterance was irretrievably lost; and he realized that if the same nerve was cut in the human being he would be rendered speechless. This discovery upset all the prevailing theories that the function of the brain was to cool the blood, and it was the first step in proving the function of the brain. It was generally held that the seat of intelligence was situated in the heart, and that speech arose by means of the vocal cords being squeezed out of the lungs just as the urine is squeezed out of the bladder by the abdominal muscles compressing the bladder walls.

This peaceful time of research came suddenly to an end. In A.D. 161 the Parthians rose in revolt, destroyed a Roman army ten thousand strong, and advanced into Asia Minor. The Romans poured fresh troops into Asia Minor, and the revolt was suppressed after a campaign lasting eighteen months. Naturally, conditions in Pergamum were unsuitable for research, and, most of the gladiators having been pressed into the army, Galen's clientèle had departed. He therefore decided to visit Rome and to try his fortune in the great field offered by the imperial city.

Galen has been accused of cowardice by various historians, in that he did not enlist and go to the front; but, as he left his native city quite openly and on his return was received with honour, this accusation would appear to be without foundation.

Towards the end of the year A.D. 162 Galen left Pergamum and, travelling by way of Alexandrian Troy, Lemnos (that windy island only too well known to members of the A.I.F. who served on the Peninsula of Gallipoli), Thessalonica and Greece, arrived in Rome shortly before March, 163. He came to Rome at the age of thirty-two years, and on this, his first visit, remained there three years.

Before his experiences in Rome are described, it will be interesting to obtain some idea of the conditions existing in that city at the time when our provincial surgeon arrived to storm the medical fortress. This was strongly held by various medical sects, having in common only one thing—their mutual hatred of one another. For a description of the Roman Empire of the day, no better picture can be found than that given in the eloquent language of the great historian, Gibbon, who, in the first chapter of "The Decline and Fall of the Roman Empire", writes:

In the second century of the Christian era, the Empire of Rome comprehended the fairest part of the earth, and the most civilised portion of mankind. The frontiers of that extensive monarchy were guarded by ancient renown and disciplined valour. The gentle but powerful influence of laws and manners had gradually cemented the union of the provinces. Their peaceful inhabitants enjoyed and abused the advantages of peace and luxury.

A few chapters further on the same historian continues:

If a man were called to fix the period in the history of the world, during which the condition of the human race was most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian to the accession of Commodus. The vast extent of the Roman Empire was governed by absolute power, under the guidance of virtue and wisdom.

At the head of Rome when Galen arrived was the saintly Emperor, Marcus Aurelius Antoninus, the most upright and conscientious of Roman rulers, who was to become the friend and patron of our Galen, and whose son, Commodus, was placed in his medical charge while the Emperor was away fighting the German barbarians. Official Rome was at this time an academy with the Emperor, Marcus Aurelius, as its head, and at his feet consuls, prefects and senators were keenly pursuing virtue and philosophy. Into this brilliant society burst the accomplished Galen, well versed in all the latest knowledge of philosophy and the sciences. He was immediately received with acclaim by the learned laymen. His reception by the adherents of the various medical sects who argued and fought one another was not so cordial. Galen, with his prejudice against sectarianism, could hardly expect to be *persona grata*. The American historian, Walsh, gives us a graphic picture of the commotion aroused by the new and novel views put forward by the newcomer, and I cannot do better than quote him:

As in Pergamum on his return from Alexandria, so now in Rome; within one year he was the most talked of man in the city. And the diversion produced by the opposition of the medical men to his new discoveries made half of officialdom and three-quarters of the physicians forget for days at a time that an actual war was being waged on the frontier. In front of the book-stalls on the Sandalarium just to the north of the Forum, in front of the apothecary shop on the *Sacra Via* to the east of the Forum, in the huge and magnificent baths of Tragan where they went to exercise and bathe each afternoon, and finally in the Temple of Peace, which was the recognized Assembly Hall of Physicians, the medical men, aided by the sophists, wrangled with Galen, aided by his pupils and the philosophers, until there was scarcely an intellectual person in the Capital who was not taking sides, and everywhere

people smiled with amusement when they recollected that the Assembly Hall of Physicians was euphemistically called the Temple of Peace.

I do not want to weary you with a description of the doctrines of the various medical sects. Their names convey nothing to modern ears—dogmatists, empirics, methodologists, pneumatists, eclectics, Hippocrateans, Praxagoreans, Herophileans and Erasistrateans. The methodologists and their offspring, the Thessalian methodologists, were specially obnoxious to Galen. This sect considered that six months' study was quite sufficient to train a doctor, and were turning out doctors by the dozen; when Galen stigmatized their founder as impudent, insolent, stupid, barbarous and asinine, only the intervention of powerful friends saved our Pergamene colleague from assassination.

During the first two years of his life in Rome, Galen came before the public in two capacities—as a public demonstrator of anatomy and as a practitioner. His anatomical demonstrations were frequented by fashionable Rome, and in this way Galen was brought into contact with the patrician classes and with the leading Roman savants, who were persons of influence as well as culture. The views put forward by our demonstrator were in many cases novel, and he threw down a challenge to the supporters of the accepted theories; placing the works of the old authors on the table, he showed where they had erred. This action led to much controversy, and did not add to the popularity of Galen.

The question may be asked whether Galen dissected human bodies, as it has been said that most of his anatomical errors were due to inferences drawn by analogy from his dissections of animals. Most of his dissections were done on pigs and other animals, and especially the Barbary ape, which is still found at Gibraltar. This ape in its muscular anatomy closely resembles man, but there are certain important differences. Galen tells us that it was possible to obtain the bodies of criminals condemned to death or cast to the beasts in the arena, or the bodies of infants exposed by their parents. That he had familiar knowledge of the human skeleton is obvious, for he tells us that it is not sufficient to read books about human bones—one should have them before one's eyes—and that the best place to study osteology was at Alexandria.

Galen advises the student to dissect apes in order to prepare himself for intelligent dissection of the human body, should he ever have the opportunity. He relates an amusing story of the dissection of an elephant. The medical profession gathered in force, for a discussion had arisen as to whether the elephant's heart had three ventricles. Galen assured them beforehand that it would be found similar to the heart of any other breathing animal. As usual, to the annoyance of everyone, his opinion was correct. The dissection being completed, the imperial cooks appeared on the scene and seized the huge heart, and that evening it figured as an appetizing dish at the emperor's dinner table.

Galen's anatomical studies led him to believe that anatomical structures had been specially designed by a beneficent creator for the special uses they severally subserve. In short, Galen was a teleologist, possibly the earliest. His description of the hand, of which he speaks as "a sincere hymn to the praise and honour of the Creator", we should think to have been written by one of the early Christian writers, if we did not know that the author was a pagan. Let me read you a short extract:

Whoever admires not the skill and contrivance of nature must either be deficient in intellect or must have some private motive which withholds him from expressing his admiration. He must be deficient in intellect if he do not perceive that the human hand possesses all those qualifications which it is desirable it should possess, or if he think that it might have had a form and construction preferable to that which it has; or he must be prejudiced, by having imbibed some wretched opinions, consistently with which he could not allow that contrivance is observable in the works of nature.

Such persons we are bound to pity as being originally infatuated with respect to so main a point, while at the same time it behoves us to proceed in the instruction of those happier individuals who are not only possessed of a sound intellect, but of a love of truth.

But if I waste more time on such profligates, virtuous men might justly accuse me of polluting this sacred argument, which I have composed as a sincere hymn to the praise and honour of the Creator; being persuaded that true piety to Him consists, not in the sacrifice of whole hecatombs of oxen, nor in the offer of a thousand varieties of incense, but in believing within ourselves, and in declaring to others, how great He is in wisdom, power and goodness.

During Galen's lifetime the Christians were growing in numbers and influence; and no doubt the belief of Galen in the beneficence of the Creator rendered his writings acceptable to the Christian Church, and may explain in part the influence exerted by his doctrines during the Middle Ages. The Church having accepted Galen, it became heresy for any medical man to attempt to prove him wrong.

Galen, on settling at Rome, had taken a house large enough to accommodate patients, and began to practise both medicine and surgery. However, it was the custom in the capital city to specialize, and so Galen confined his practice to medicine. His first acquaintance of note was Eudemus, a disciple of Aristotle, who was giving excellent lectures on the teachings of the Stagyrte philosopher, and Galen enrolled himself as one of his students. Through Eudemus he met Flavius Boethus, one of the richest and most influential men of the capital; this friendship was of great advantage to Galen, and lasted until Boethus went out to Syria as governor, where he died.

One of his fashionable patients was the son of his friend Boethus. The boy was ill and feverish at nights without any obvious reason. Galen put him on a low diet. The temperature still rose at nights; Galen concluded that the boy took food on the sly. This turned out to be the case. "That is a wonderful divination of yours", remarked the father, "which can detect hidden cakes".

On another occasion he was called to see a Roman lady who suffered from general malaise. He was able at once to exclude bodily disease, for there was neither fever nor a generally quickened pulse. He saw clearly that her complaint was mental. He fell into conversation with her, and noticed that on the mention of the name of a certain actor, Pylades, her pulse became hurried and irregular. He had his suspicions, but employed an ingenious method of verification. On subsequent visits he caused the names of other actors to be mentioned while his finger was on the pulse; the pulse remained unchanged; but on the mention of the name of Pylades it again became hurried and irregular. Many such stories are to be found scattered throughout Galen's writings; but our time is limited.

If Galen's fame as a medical man grew, the jealousy and opposition of the various sects grew even more rapidly, and he was accused of resorting to magic arts and divination in his marvellous cures and prognostications. Worn out at last by the continual strife, he made up his mind to return to his native Pergamum. He tells us feelingly

that many tire of the long struggle with crafty and wicked men which they have tried to carry on, relying upon their erudition and honest toil alone, and withdraw disgusted from the madding crowd to save themselves in dignified retirement.

Saddened by the departure of his powerful friend Flavius Boethus, and no doubt fearing that, once Boethus's protection was removed, the spite of his enemies might lead to his sudden demise, Galen left Rome about March, 166, and travelled by way of Brindisi, Cassiopea, Macedonia, Lemnos and Thasos to Pergamum. Receiving an invitation from Boethus to visit him in Palestine, he went to Caesarea, and after some months spent in the Holy Land returned to Pergamum via Cyprus.

A year passed by, and towards the end of 168 Galen was summoned to join the Emperors Lucius Verus and Marcus Aurelius at Aquileia, at the head of the Adriatic Sea. The Roman troops had gone into winter quarters after their campaign against the Marcomanni, when plague broke out, and Galen's professional services and advice were urgently required.

At the beginning of 169 the emperors, with Galen and a part of the army, left Aquileia for Rome, and on the way thither the Emperor Lucius Verus died at Altinum. On his arrival, Galen was appointed physician to Commodus, the son of Marcus Aurelius, who was later to become one of the most depraved emperors who ever held the imperial dignity, and whose crimes were the beginning of the decadence and ultimate downfall of Rome.

Once again the German provinces flared into revolt, and Marcus Aurelius set forth in one more endeavour to subjugate the Quadi and Marcomanni, leaving Galen to take care of his family.

The years 169 to 175 were spent by Galen at Ostia, the seaport of Rome, and also at Lorium and Lanuvium, with a visit to Naples, at all of which towns there were imperial country houses. His time was occupied with a small amount of consulting

practice and an immense amount of dissecting and writing. To this period of comparative peace we owe many of his most important writings, among others his works on the elements, the temperaments, the natural faculties, the use of the parts, the pulse, respiration, disease, symptoms and therapeutics.

In June of 176, Marcus Aurelius and Commodus, who had accompanied his father to help stamp out the revolt of Avidius Cassius in the East, returned to Rome. Returning across the Adriatic to Brundisium from Athens, the emperor's vessel encountered a severe gale, and on his arrival at Rome the Emperor fell ill. As this illness was the first occasion on which Galen had actually attended his imperial master, I may be forgiven if I quote Galen's account of the episode, as it throws some light on medical procedure of the time, and as it also greatly influenced Galen's future in Rome. Here is his story in his own words:

The first day after the Emperor's return to the capital he took a little draught of aloes about 6 a.m. and followed it by the theriac, which he took daily. About noon he had luncheon, at six he bathed, then ate a light dinner, and during the night suffered from tormina, constipation and fever. His physicians ordered rest and liquid nourishment. Following this I was called and requested to sleep in the Palace.

The next morning, while the lamps were still lighted, I was called by a messenger to his presence. Three physicians who had arrived at daybreak were already there. After feeling his pulse, they decided that the beginning of an attack was at hand. I, however, stood by silent. Looking at me the Emperor asked why I did not feel the pulse like the others. I responded "since they who have been travelling with you, and who, therefore, ought to understand the properties of your pulse by experience have already felt it twice, I can scarcely hope to learn more from it about the present affection".

Nevertheless he ordered me to feel it. Since it appeared exactly normal to his age and nature, I said that it in no way indicated the beginning of an attack of fever. In my opinion, I stated, the stomach is compressed by the recently taken nourishment which has turned into phlegm before it was excreted. Since this diagnosis corresponded with the idea of the Emperor he said "that is so, it is just as you have said, I feel that I am weighed down by chilling food". He now asked what was to be done. The other physicians suggested sending him to the bath or giving him nourishment. When he asked me I answered as I felt saying, "If another was so affected I would give him some wine to which he was accustomed with a dash of pepper in it. In the case of a king for whom physicians make special effort to do even the little extras which add to immediate comfort, I would in addition apply to the orifice of the stomach a wool bandage impregnated with warm spikenard ointment." He asserted that it was his custom when anything was wrong with his stomach to apply a warm spikenard ointment on purple wool. Ordering Pitholaus to prepare it, and dismissing us, he had his feet rubbed by warm hands and asked for Sabine wine with pepper.

After the drink he said to Pitholaus, that there was one physician who was not hide-bound by rules, and from this time he never stopped lauding me. He is the First of Physicians, said he, and also of Philosophers. For Marcus had already had experience of many, not only desirous of money, but contentious, vain-glorious, envious and malignant.

The two years following (176 to 178) were the happiest and most peaceful of the nineteen-year reign of the saintly Marcus Aurelius. Galen, too, shared fully in this golden age. Commodus, his

pupil, had grown into manly beauty, and was the delight of the Roman populace; and few could have foreseen the dreadful years which were to follow the death of Marcus in 180. Galen was given the credit for having preserved the life of their beloved emperor, who was worshipped by his people not as a man, but as a god temporarily lent to earth. During this period Galen wrote his huge work on hygiene, so taking hygiene out of the hands of the gymnastic trainers and placing it in the study of medicine, thus, as Walsh tells us, "creating himself the Father of Hygiene".

Finding conditions so pleasant in the imperial city, Galen decided to sell his estate in Pergamum, and in 179 paid a flying visit to his native town, calling at Athens on the way. He returned for good to Rome, bringing with him his library, and for a while fortune smiled upon him. The death of Marcus Aurelius was followed by the accession of Commodus, who reigned for thirteen dreadful years. Then came a well-meaning but weak emperor, Pertinax, whose term as emperor had lasted only three months when once again the assassin's knife set the Romans free for a few weeks. His successor, Didius Julianus, was executed after two troublous months; and once again Rome breathed purer air under the virtuous Emperor Septimius Severus. All this you may read in the eloquent pages of Gibbon; it makes very sad, but most interesting reading—sad because it is difficult to believe that human beings placed in positions of power could sink so low.

Meanwhile we lose sight of our physician, and beyond a glimmer of light in 198, when he published his medical treatise on antidotes, all knowledge of him is lost. When or where he died we do not know; some say he ended his days in Rome, broken by the misfortunes and calamities which had overtaken the city of his adoption; others say that he ended his days in his native city, working and pondering, like Democritus some hundred of years earlier, on the foolishness of mankind.

A few words must be said about Galen's anatomy and physiology. Those of you who are interested will find an excellent account of his anatomy in Dr. Singer's "History of Anatomy". I have already said something of his anatomical studies, and will only repeat that his work on the muscular system was of a really pioneer character. Of his physiological doctrines it has been said that they are like the basket of figs shown to the prophet Jeremiah: those of them that are good are very good, those that are bad are very evil. The parts of physiology which lent themselves to the methods of investigation open to him are often exceedingly well handled, while the regions which it was impossible for him to explore are often lit up by flashes of real insight. He came within an ace of discovering the circulation. The structure and function of the several valves of the heart, their condition in systole and diastole, the course of the circulation from the veins into the right side of the heart, the anastomosis between the arteries and the

veins, were all well understood by Galen, and he disproved the long-accepted theory that the arteries contained air. Like many another great physician who followed him, he missed the true nature of the circulation, and it was left for the immortal Harvey to demonstrate the truth fifteen hundred years later.

His theories of life have now only an historic interest for us, and I do not intend to weary you by detailing them; but in his investigations of the central nervous system he anticipated many of the discoveries of Sir Charles Bell and Magendie.

In his treatment of disease he enunciated two fundamental principles. These were: (i) that disease is something contrary to Nature and is to be overcome by that which is contrary to the disease itself, and (ii) that Nature is to be preserved by what has relation with Nature. He recognized that while the invading disease must be repelled, the strength and constitution of the patient should be preserved, and that in all cases the cause of the disease was to be treated and not only the symptoms. In his treatment he was a great advocate of exercise and gymnastics, and he recommended cold baths for the young and hot baths for the elderly. At times he lapsed into poly-pharmacy and nostrums. In acting thus he merely followed the fashion of his day in complying with the wishes of the multitude, and to him we owe the saying: *Populus remedia cupit*. This saying still holds true at the present time, for the faith of the patient in the bottle of medicine dies hard.

Galen offered excellent advice concerning behaviour in the sick-room: visits should not be paid untimely or too often; they should not be burdensome through loud speech or noise; the physician should, to a certain extent, accommodate himself to the patient's level of education, to his inclination and habits. Tactless speeches should be guarded against; for example: "Patroclus is dead, and he was a more important man than thou art." As an example to be avoided, the great physician Cointos is mentioned, who smelt strongly of wine; to a fever patient in an important house who complained of this he retorted: "What, then, thy fever smells worse."

The warning about noise was no doubt inspired by the practice of some of the doctors, who went about followed by a retinue of pupils and grateful patients, and this unpleasant custom was satirized in one of the epigrams of Martial as follows:

Faint was I only, Symmachus, till thou
Backed by an hundred students, bring'dst my bed;
An hundred icy fingers chilled my brow:
I had no fever; now I'm nearly dead.

The quack doctor, then as now, flourished greatly, and besides quack doctors there were drug sellers (*pharmacopola*), who sold medicines in booths or hawked them in the city and the country. If we are to believe Galen, the only difference between the bandits and the medical men was that the former robbed their victims in the hills and the latter in the city.

Have the teachings of Galen any lesson for the medical men of the present day? I think that this question can be answered in the affirmative. Galen set a very high ideal as a standard for the medical profession, insisting that it was only by close contact with Nature, by the study of the experience of others and by careful reflection that the practitioner could hope to arrive at an understanding of disease. His teaching that the patient must be treated as well as the disease warns us against a growing tendency in modern medicine. We are inclined to label patients with the names of certain diseases and to treat the disease rather than the patient. With the threatened approach of nationalization of the medical profession, the doctor will become a salaried public servant, who will be called upon to treat a certain number of patients, and who will so lose that personal knowledge of his patients and their individual peculiarities which has contributed so largely to successful treatment in the past. The public as well as the doctor will be the losers, for it is well to remember that sick people are more than so many cases, interesting or otherwise, and that they cannot be treated intelligently by rule-of-thumb methods. This was the great basis of Galen's quarrel with the sect of methodologists, who taught that diseases were things without relation to anything.

Galen would not have approved of the modern physiological schools which seek to explain many bodily activities by purely mechanical and chemical terms, such as filtration, diffusion and osmosis. He would have had more sympathy with the vitalistic theories of the eighteenth century German physician Stahl, who taught that behind all these activities there was a vital principle which governed them.

The possible evils of another modern tendency in medical practice were pointed out by Galen when he inveighed against indiscriminate specialism. He stressed the danger of dividing the profession into a large number of practitioners whose knowledge would be limited to their specialty. His constant teaching was that proper knowledge of a disease could be arrived at only by consideration of the body as a whole.

With the death of Galen medical science may be said to have entered upon a period of slumber, which lasted thirteen hundred years. During these centuries all scientific experimentation ceased. A few daring spirits carried out researches at the peril of their lives in this world, and, as the Church taught, at the peril of their souls in the next. With a few outstanding exceptions, medical men like Galen, imbued with scientific curiosity, ceased to exist. Galen tells us:

I confess my disease from which I have suffered all my life long, to trust none of those who make such statements until I have tested them for myself in so far as it has been possible for me to put them to the test.

To acknowledge in the Middle Ages that one suffered from the disease of scepticism was to invite a speedy and unpleasant end.

With the collapse of the Western civilization which followed the downfall of the Roman Empire, the teaching of the ancient world was in great measure lost, and one of the greatest services rendered by Galen to the medical world was his attempt to weld together all that was good in the doctrines of Hippocrates with all that was good in the doctrines of the various medical sects. If it had not been for the work of Galen in systematizing the medical knowledge of his time, all the best part of the medical knowledge of the Greeks would have been swept away.

As I have said, the date of Galen's death is unknown, but it was probably in the first years of the third century. We are also ignorant of the place where his bones rest, and his grave, like that of the great anatomist Vesalius, who in his work corrected many of Galen's errors, must remain without monument. Men like Galen and Vesalius have left imperishable monuments in their works and lives. To quote the words of Sir Thomas Browne:

But who knows the fate of his bones, or how often he is to be buried? Who hath the oracle of his ashes, or whither they are to be scattered? The relics of many lie, like the ruins of Pompeys, in all parts of the earth.

As the years pass, and as his works are more fully studied, the fame of Galen will grow. He was not one of the great geniuses of the world, but he stood very high in the second rank. He was one of the most illustrious of all physiologists, and among the ancient physicians we may still allow him the old honourable epithet so often used: *Omnium medicorum secundum Hippocratem facile princeps*.

Here in Queensland you have founded the youngest of the medical schools of Australia. It will grow into a great and famous school; but let me exhort you not to ignore the past, and to remember that on occasions

'tis opportune to look back upon old times, and contemplate our forefathers. Great examples grow thin, and to be fetched from the passed world. Simplicity flies away and iniquity comes at long strides upon us.

Throughout Europe, including Soviet Russia, throughout Asia and North and South America, lectureships in the history of medicine have been founded at the universities and medical schools—everywhere except in Australia. By founding such a lectureship Queensland has a chance to broaden the cultural outlook of her medical students and to remove the reproach so often voiced, that our Australian universities are merely higher technical colleges, in which men are taught to make a living, but in which culture is neglected.

May I conclude by expressing the hope that Dr. Sandford Jackson, who is still with us, and in whose honour I am here tonight, may be spared to enjoy many happy years of retirement. That we may see from his pen many more of the charming essays in which he has thrown much light on the early days of Australian medical history is, I am sure, the wish of us all.

SCHIZOPHRENIA AND ITS TREATMENT BY INSULIN AND "CARDIAZOL".

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WHILE it is gratifying to look back upon the number of social and administrative reforms which, during the past century, have done so much to lighten the darkness in mental hospitals and to bring a rational and humanitarian spirit into the custodial treatment of mental illness, one is forced to admit that, despite a growing therapeutic enthusiasm, the understanding and treatment of the large bulk of mental cases are still in their infancy. Even when one has set aside as being beyond the reach of treatment in the strictly curative sense the senile, arteriosclerotic and mentally defective patients who form a considerable percentage of the average mental hospital population, there remain the biogenetic psychoses, the affective and schizophrenic reaction types, for whom as yet no specific form of treatment has been found.

The introduction and widespread application of occupational therapy, together with the earlier recognition of psychotic states, the biochemical and serological refinements of diagnostic technique and the clearer understanding of mental mechanisms made possible through the work of Freud and other contemporary psychopathologists, are among the minor triumphs of mental healing in this century. In the sphere of organic treatment the work of Wagner-Jauregg crowned the brilliant researches of Schnaudin, Wassermann and Noguchi, and led to the ultimate victory over general paralysis, which to the psychiatrist had for so long seemed the most malignant and fatal of all mental diseases. Subsequent advances in chemotherapy served to reinforce the beneficial results of malarial treatment in general paralysis; but, though the devices of organotherapy have been utilized with considerable ingenuity, and though the chemists have made many inventions, the results obtained by their use in the biogenetic psychoses have been somewhat illusory, not to say disappointing. I stress this point at the outset because I shall subsequently describe a non-specific form of organic treatment which has, in the past few years and in the hands of many able psychiatrists, given promise of very great value in the treatment of schizophrenia.

The insulin-"Cardiazol" treatment is not just *le dernier cri* of a few self-inflated psychiatric enthusiasts, eager to impress the world with their therapeutic legerdemain. It is not heralded as a cure-all for the hordes of deteriorating primary dementes in mental hospitals, nor is it offered as a panacea for that bewildering variety of schizoid psychopaths which so materially adds to the social subnormality of the race. It is frankly an empirical remedy, intended and believed to help in the readjustment of early cases. It is dangerous, but

not more so than any major surgical operation. It is tedious and difficult to learn, and it requires expert psychiatric judgement. Yet so encouraging have been the results obtained within the last three years that one may now see it carried out in many of the clinics and mental hospitals throughout Europe and in the Soviet Union. In America it is receiving the closest attention in the New York and Massachusetts State Hospitals, at Bellevue Hospital, New York, and in other scientific centres. In Edinburgh, under Professor D. K. Henderson, it was started some two years ago. Last year the English Board of Control sent Dr. Isabel G. H. Wilson to Europe to report on insulin treatment, and her report⁽¹⁾ contains not only some very favourable impressions, but also a strong recommendation that the treatment be carried out in England; so that now in London at least two of the London County Council mental hospitals and two private mental homes have instituted an "insulin treatment unit".

Schizophrenia, the Psychiatrist's Most Urgent Problem.

Psychiatrists are recognizing ever more clearly the social and economic consequences of that tragic psychotic maladjustment known as schizophrenia. It claims more victims than either cancer or tuberculosis. In the United States of America statistics show that each year some thirty to forty thousand young people will succumb to schizophrenic illness, and in proportion to the population the number of cases in Australia would appear to be similar, for at least one-quarter of the patients admitted to mental hospitals are suffering from this disorder.

The understanding, diagnosis and treatment of schizophrenia constitute, without doubt, the biggest problem in present-day psychiatry. It takes its toll of the young at an age when the promise of life is normally as bright as the sunrise. It strikes at the rich and the poor alike, and rather more often at those whose burgeoning minds show promise of superiority than at those whose bovine brains foreshadow stupidity. It may come "out of a clear sky", as it were, and fall as a blight upon a family which may have ample reason to be proud of its ancestry; or it may creep insidiously upon members of "tainted" families, where alcoholism and consanguinity or cyclothymia mingle in the hinterland of inheritance. It may be episodic or chronic, but unless, fortuitously or as the result of treatment, an early and successful adjustment to reality is accomplished, chronicity is almost invariably established. And it condemns its victims to a life stultified by hospital routine, cut off from normal human activity and intercourse, and devoid of those emotional outlets which weave threads of joy and romance through the intricate patchwork of normal lives: a life hemmed in by walls and prohibitions, by red tape and regulations which, no matter how camouflaged by kindness or softened by sympathy, make mere existence a living death.

Dementia præcox and schizophrenia are not synonymous terms: the latter includes the former and is more psychiatrically apposite. *Dementia præcox*, a term dear to the descriptive psychiatrist of the last generation, having served a useful purpose in the hands of Kraepelin, has been superseded as being too narrow and misleading; and schizophrenia, in the sense in which it has been used by Bleuler,⁽²⁾ includes unsystematized delusional states, many atypical excitements and depressions, certain confusional and twilight states and other somewhat indefinable schizoid types linked together basically by a "splitting of the personality", in conjunction with autistic thinking and renunciation of reality. In drawing attention to symptoms which can now be seen to be fundamental to all varieties of psychotic maladjustment in the schizophrenic reaction types, Bleuler did valuable work. His concept of schizophrenia has, however, been adversely criticized because it gains in comprehensiveness at the expense of conciseness. The majority of English-speaking psychiatrists, both in the British Empire and in the United States of America (together with many of those in Europe who were trained in the Kraepelin school), while recognizing a certain value in Bleuler's doctrines and being willing to retain and utilize the word, are inclined to place stricter limits upon the term and to confine within its meaning only those cases whose reaction-patterns fall within well-defined and accepted limits, such, for instance, as those formulated by the American Psychiatric Association and used throughout the whole United States. As Bleuler and his followers use the term "schizophrenia", it will be seen to include the whole mass of functional psychoses, with the exception of a small group of well-defined manic-depressive cases and the true paraneuroses. Other workers adhere more to the old *dementia præcox* grouping, with its four divisions of simple, hebephrenic, catatonic and paranoid types. Bleuler himself believes that only about 20% of his schizophrenics show marked mental deterioration, which is a very much smaller percentage than that commonly accepted by the more stringent followers of Kraepelin.

I stress this difference, because it will account for the discrepancies in the results of different workers using the same form of treatment upon patients suffering from what each may regard differently as schizophrenia. This distinction was impressed upon me in visiting the Swiss mental hospitals, whose medical officers without exception adopt Bleuler's ideas; and therefore the Swiss group is liable to contain many more patients—particularly those with atypical depressions and mild confusional symptoms—with an essentially more favourable prognosis than is likely to be present in a group which contains patients limited to those of an accepted *dementia præcox* type.

Spontaneous Remissions.

Any evaluation of the effects of treatment, in order to approach accuracy and so to stand com-

conclusion

parison with other methods, must allow for what has been called "spontaneous remission". There are few practising psychiatrists now who would claim, as was once the case, that the condition of any patient who recovered from *dementia præcox* had been wrongly diagnosed, for practically all are agreed that remissions do take place, particularly in the early stages of the illness. Though many of these remissions are temporary and of comparatively short duration, some patients do seem to recover in the literal sense of the word. Wootton⁽³⁾ and his co-workers, in an investigation into the after-histories of discharged mental patients, state:

The authors have been impressed by the number of instances in which clinically typical schizophrenics show no traces of the "præcox" attitude persisting a considerable number of years after recovery.

Unfortunately it is not yet possible to forecast with any accuracy which cases are liable to remission. But the statements in the previous paragraph may help to furnish an explanation for the discrepancies which exist in the figures given by different authors for the percentage of spontaneous remissions that are said to occur in schizophrenics—figures which in some cases are as low as 2% and in others as high as 39%.

There are so many factors in age, in environment, in aetiology *et cetera* which may quite possibly contribute to a spontaneous remission that it will always remain impossible to arrive at a set figure. Again, there are variable factors in the home environment, in the personality, in the hazards of physical health and of emotional balance which may hasten or stay the tendency to relapse, so that it will generally be impossible to predict whether such a remission will be temporary or permanent. Time, as in all speculations, will be the chief arbiter.

While some remissions are said to be complete, the patient regaining full insight and showing no trace of his previously disordered thinking or conduct, there are many which remain incomplete. In such cases recovery is achieved up to a certain point; the patient is socially improved and may even make a rough adjustment with home environment, but on examination traces of the old symptoms (mannerisms, delusions, loss of initiative *et cetera*) will be evident. Such patients are said on the Continent to have "recovered with defect".

The fact is soon borne in upon anyone who studies this aspect of schizophrenia that the percentage, type and duration of spontaneous remissions are extremely arbitrary. Müller⁽⁴⁾ believes the figure for spontaneous remissions to be between 15% and 20%, but he gives no indication as to what percentage of these may be permanent or what percentage may be complete. This difficulty is increased still further when the value of a particular treatment is being assessed, inasmuch as it is known that almost any form of treatment will engender beneficial—albeit temporary—results in early cases. This fact often promotes a false optimism in those who instigate and apply a new

form of treatment; but it also provides an opportunity for the wily sceptic to become more wily, and for the dispirited pessimist to launch a fresh anathema against what he considers to be the blind empirical fumbblings of the optimistically inept. The literature of schizophrenia is ornate with brave beginnings and derided nostrums.

Empirical Treatment.

Difference of opinion regarding its nature and cause is an outstanding feature of schizophrenia; and search for a specific somatic pathology has yielded many conflicting results, but none upon which the illness can be fully explained. Evidence is constantly accumulating which shows that schizophrenia is prone to develop on a constitutionally defective basis, yet the pioneer work of Mott has been seriously questioned by the findings of later workers,⁽⁵⁾ and the cerebral cortex has so far eluded the most persistent endeavours to establish a specific cellular pathology. While there are workers like Nolan Lewis⁽⁶⁾ who, on account of the cardio-vascular and glandular aplasia frequently observed, are inclined to regard the disorder as an heredodegeneration, and others like Karl Abraham⁽⁷⁾ who believe that "*dementia præcox*" is an autoerotic phenomenon in which the patient is without normal, affective reactions to the external world", it is only natural that treatment should be empirical.

No apology need be made for this statement. To the academic rebuke that to apply experimental treatment in the absence of theoretical support is to outrage reason by reversing the positions of the horse and the cart, the therapist is justified by many an honoured example in medicine in replying that the position of the horse is immaterial so long as the cart moves.

A large variety of organic and inorganic substances have been tried and found wanting in the treatment of schizophrenia.⁽⁸⁾ Among the more hopeful are the fever-producing agents, glandular products, and sedatives employed to produce prolonged narcosis. Mostly the results have been disappointing. Whether the pyrexia is produced by the injection of typhoid vaccine, of sterile milk, of "Pyriker" or of "Sulfosin", whether by inoculation with malaria, by diathermy or by any other means, the results have not been such as to commend themselves universally for the routine treatment of schizophrenia. It is true that some psychiatrists, rather than stand by and watch their patients deteriorate, are still applying these methods, and they are sometimes rewarded by success.

Some eight or nine years ago I tried the effect of producing an aseptic meningitis by introducing twenty cubic centimetres of normal sterile inactivated horse serum into the spinal theca of schizophrenic patients of the hebephrenic and mildly catatonic types. This had the effect of raising the temperature and the pulse and respiration rates, of altering the leucocyte count, of lowering the haemo-encephalic barrier and of shifting the acid-base

equilibrium. The immediate results were promising, but in the majority of cases transient. Some patients appeared to achieve remissions, one lasting as long as seven months; but as all the patients so treated were well-established schizophrenics, with more than two years' previous residence in a mental hospital, it is not surprising that eventually they found their way back to the mental hospital from whence they came. Later experience with irritant fever therapy in the form of intragluteal injections of "Sulfosin" yielded similar results. I believe, however, that in selected recently affected patients of the hebephrenic and catatonic type, before they have had many weeks' residence in a mental hospital, "Sulfosin" does produce valuable and, in some cases, lasting remissions. There are reports in the literature⁽⁹⁾ to show that "Sulfosin" therapy, carried out on a group of selected patients, has resulted in 20% more remissions than were achieved spontaneously in a similar group of untreated patients. Whether such remissions have been of long standing or not, these results would, in the absence of a better method, justify the continuance of this form of treatment.

Of endocrine substances—"Theelin", "Progynon", "Antuitrin", testicular extract and a host of similar preparations—thyroid extract holds pride of place in schizophrenic therapy. The schizophrenic patient is often abnormally tolerant towards thyroid extract; and, as in the case of pyrotherapy, some brilliant successes and a number of undoubted improvements have resulted from this form of organotherapy. Massive doses of thyroid extract are still occasionally administered to stuporous catatonics and to female hebephrenics with amenorrhœa, but the consensus of opinion is that its sphere of usefulness is very strictly limited.

Paul Hoch⁽¹⁰⁾ recently commented on the results obtained with prolonged narcosis, which was achieved by combinations of scopolamine, "Avertin" and "Pernocton" with "Luminal". He found a few recoveries and improvements among the acute cases, but no beneficial results in the chronic cases. He considers that "acute schizophrenic patients with excitement, depression or apprehension are suitable cases for prolonged narcosis". Less favourable results are obtained in the other cases. Müller,⁽⁶⁾ in his summary, comes to similar conclusions: "acute catatonics are specially suitable, whereas early hebephrenics and paranoid forms do not react so well". Much work has been carried out on prolonged narcosis by means of "Somnifaine" in the English mental hospitals,⁽¹¹⁾ but, except in catatonic cases, as already stated, the results have been rather discouraging.

It will be unnecessary to comment on such other therapeutic endeavours as have been made with "Dekrysil", manganese chloride, yohimbine, colossal calcium, and with the inhalation of "Carbogen", or with other ingenious but none the less ineffectual methods. Though their name is legion, their destination is limbo.

The whole point about the empirical organic procedures of the past is that, while it is better to apply treatment which will achieve sporadic success and a certain amelioration of symptoms than to stand by in pitiful and aimless resignation, none of the above-mentioned methods is capable of giving results consistently better than those which are liable to occur spontaneously, if one accepts the dictum that such remissions occur in approximately 20% of unselected schizophrenic patients.

Insulin Hypoglycæmic Therapy.

Although a number of workers are now using both insulin and "Cardiazol", in some cases in combination, the two forms of treatment were evolved separately by different workers in different countries at approximately the same time; but as the so-called "insulin shock treatment" was the first to achieve other than local recognition, I propose to describe it first.

It was introduced in Vienna, at the University Neurological and Psychiatric Clinic of Professor Otto Pötzl, by Dr. Manfred Sakel⁽¹²⁾ in 1933. The previous year Dr. H. Torp had described in a Norwegian journal the beneficial results which were seen to follow hypoglycæmic coma in a schizophrenic patient. Dr. Sakel had already experimented with insulin in the treatment of morphine addiction, and now commenced to test the effects of hypoglycæmia in schizophrenic subjects, with the result that in a few months the "insulin shock treatment" became an established procedure at the Vienna clinic, and Professor Pötzl himself became one of its most ardent supporters. From Austria the treatment spread to Switzerland and from there to Poland, until now there is scarcely a psychiatric centre in Europe that is not interested in insulin.

My own interest in the hypoglycæmic shock treatment was first stimulated in April, 1936, on receipt of a paper from Dr. H. Pullar Strecker, who had instituted the treatment in Edinburgh under the auspices of Professor D. K. Henderson. I commenced the treatment on three patients—one catatonic and two hebephrenics—all in the early stages. The maximum individual dose of insulin used was 90 units, and the patients received on an average twelve shocks. Though all three patients were sufficiently improved to leave hospital, I was not impressed with the treatment, and it was only after seeing the more extensive insulin work in Europe that I realized that I had neither made my shocks deep enough nor given a sufficient number.

In Vienna at the beginning of this year, through the courtesy of Professor Pötzl, I was enabled to spend a week in the insulin wards of his clinic under the direct tutelage of Dr. Palisa and Dr. Dussik, Sakel's co-worker, and to follow every stage of the treatment. Dr. Dussik also took me to Sakel's private sanatorium, where about seventeen other patients were undergoing treatment. Some time later I went to Münsingen (Switzerland), where I received the same kindly reception from Dr. Max Müller, and saw sixteen patients under treatment by Dr. Gertrude May, who has had sole charge of

the insulin department for the past eighteen months. I also visited hospitals and saw the treatment carried out in Moscow, Stockholm, Helsingfors, Warsaw, Munich, London and Edinburgh. In London I obtained valuable information from Dr. R. Freudenberg, one of the original members of Sakel's team, and from Mrs. Freudenberg, who had worked at Münsingen under Dr. Müller.

As the result of many experiments, observations and conferences, the chief protagonists of insulin therapy have evolved a more or less standard technique which has been drawn up for publication by Dr. Jakob Frostig,⁽¹⁹⁾ the Director of the mental hospital at Otwock (Poland). Dr. Frostig very kindly presented me with a typewritten copy of this compilation and gave me friendly access to his case records, treatment charts and previous publications, from which many of the following details have been drawn.

Technique.

It is customary to divide the treatment into three stages: the first, in which the patient is given insulin in gradually increasing daily doses until a hypoglycæmic shock is produced; the second, in which the dose of insulin is maintained at just that level required to bring about the shock; and the third stage, when the insulin is slowly withdrawn. The whole treatment occupies from two to three months.

The patients are treated in a separate room or in a ward in which there is at least one doctor in constant attendance, together with the required number of selected nurses and orderlies. The insulin injections are given at 7 a.m. each day except Sunday, when no treatment is carried out, and the treatment finishes about midday, when the patients are returned to their own rooms or wards for dinner. The afternoon is free, and is utilized in outdoor exercise or occupational therapy.

Patients, having undergone a thorough physical examination (including in some hospitals the taking of an electrocardiograph) are, if free from illness, given an initial dose of 10 to 15 units of insulin at 7 a.m., having taken no nourishment since the previous night. The dose is increased each day by 5 to 10 units, according to the judgement of the doctor, until symptoms of hypoglycæmic shock are induced. The number of units of insulin required to produce shock varies from patient to patient, and is apparently dependent upon a somatic-humoral complex, the nature of which has not yet been discovered. Twenty units have been found to produce shock in some patients, whereas more than two hundred units may be required in other patients. It has been observed that, generally speaking, those patients in whom the psychosis is more advanced require larger doses of insulin. The largest individual dose of which I know was 300 units; I learned of it in a personal communication from R. Freudenberg. The average dose seems to be somewhere between 70 and 140 units.

Insulin of different brands of manufacture is used in different countries. This, together with

individual idiosyncrasy, may account for some of the variation in dosage, as it does for the occasional occurrence of urticaria.

Emaciation and debility do not constitute a bar to insulin treatment; but greater care is necessary, and the preliminary stage of the treatment is carried out more gradually, with a view to achieving an increase in body weight as a result of the smaller injections of insulin, which frequently promote increased appetite. No patient suffering from active somatic disease is given insulin treatment, but those with healed tuberculous lesions and mild myocarditis may be treated according to the judgement of the physician.

The appearance of hypoglycæmic shock is heralded by numerous physical and mental changes in the patient. These shock symptoms differ in the various patients and may change from day to day in the same patient. Some patients merely become drowsy and fall into a quiet coma; others manifest prodromal restlessness, flushing and sweating before the onset of coma. Many experience short phases of marked motor unrest and excitement, and may become violent and noisy. At first the pulse rate is accelerated, but later bradycardia may appear; Frostig records a case in which the pulse rate fell to 32 per minute. Should it fall below 40, or fluctuate markedly, the hypoglycæmia must be terminated.

A patient in the hypoglycæmic state is said to be drowsy if, when touched or spoken to, he stirs but does not wake; he is comatose when the corneal reflexes are abolished; and he is in a deep coma when the light reflex is lost. All stages, from slight drowsiness to deep coma, are seen in this form of treatment. As coma deepens, the abnormal reflexes of Oppenheim and Babinski may be observed, and the flexor-plantar responses are obliterated. Myoclonic and convulsive twitchings may occur; myoclonic movements may be unilateral or bilateral; they may affect one part only, or spread over most of the body. Yawning and stretching are common. Convulsive attacks of an epileptiform nature, said to be due to cardio-vascular collapse, are not infrequently produced; and convulsions which appear truly epileptic in character may or may not be serious. Müller regards such attacks as serious indications for the interruption of the hypoglycæmic state if they occur at the beginning or near the end of the day's treatment. (I have this opinion from a personal communication.) When such an attack occurs, treatment is peremptorily interrupted, and the accepted practice is to rest the patient by giving no insulin the following day. When the treatment is resumed on the third day a smaller dose of insulin is given.

Patients often manifest acute psychomotor restlessness, apart from myoclonic phenomena, just as they are going into coma. Their movements are frequently wild and incoordinated; they may fling themselves out of bed and struggle violently if restrained. Tactful restraint is necessary to prevent accidental injury. In the hypoglycæmic state the

patient sometimes presents a miserable appearance; the skin becomes pale and damp and the expression becomes strained and agonized. Grimacing and teeth grinding may be observed. As the shock deepens, the temperature falls; it may fall so low as to fail to register on the ordinary clinical thermometer (Frostig). Salivation may become pronounced, and when this occurs the head of the bed should be raised and the patient should be supported in this position to prevent aspiration and its dangerous consequences. Respiratory changes vary according to the stage of the shock: shallow and irregular breathing alone have little meaning, but, taken in conjunction with any other untoward symptom, may indicate the advisability of premature termination of the shock.

At the risk of repetition I present a summary of the hypoglycæmic symptoms from the work of Frostig⁽¹⁴⁾ and his colleagues, Kister, Manasson and Matecki. These investigators believe that it is possible in the hypoglycæmic state to discern the following four syndromes:

1. The syndrome of vegetative and vascular disturbances (lowering of the temperature, sweating, salivation with irregular or slow pulse).

2. The syndrome of motor disturbances (tonic and clonic contractions, athetoid and choreiform movements, myoclonus, and finally a clonic crisis).

3. The syndrome of disturbances of consciousness with the appearance of the pathologic reflexes (Babinski, Oppenheim, Meyer *et cetera*).

4. The syndrome of psychic phenomena (activation of the psychosis before and after sleep).

The same authors define a grave hypoglycæmic shock as one wherein are displayed: (i) tonic and clonic contractions, (ii) loss of consciousness, and (iii) the appearance of the pathologic reflexes.

Termination of Hypoglycæmia.—Though the exact time varies with each patient, and from day to day, drowsiness usually makes its appearance in the second or third hour after injection. Patients who are drowsy and yet can be aroused to take drinks are given towards midday a cup of glucose tea (weak tea with milk or water containing 200 grammes of glucose) and a piece of bread and butter. When the drowsiness passes into coma, a nasal tube is inserted and left in the stomach. A large glass aspiration syringe is attached to the tube, and after air has been blown into the stomach, gastric juice is withdrawn and tested with litmus paper to verify the tube's position in the stomach. When coma has lasted sufficiently long, that is, from half an hour to one and a half hours—and this can be determined only by the physician taking true cognizance of the patient's physical condition—a feed of 200 grammes of glucose is given through the tube and the patient awakens gradually over a period of 15 to 20 minutes. Should there be any tendency to vomit the glucose, an alkaline powder may be added to the solution, or atropine (15 minims of 0.1% atropine solution) may be poured into the stomach before the glucose is given.

Atropine in this way is given as a routine measure at Münsingen.

Emergency Interruption of Treatment.—When it is necessary to bring about an immediate interruption of the hypoglycæmic coma (*vide infra*), this is done by the intravenous injection of "Osmon" or of 20 to 80 cubic centimetres of sterile 33% glucose solution. On physiological grounds it is believed to be inadvisable to inject more than 100 cubic centimetres of the glucose solution at the one time. The patient reacts immediately to the intravenous administration of glucose, and I have seen a patient in the deepest coma become completely awake in a few minutes. The general rule is to inject glucose until the patient shows signs of returning consciousness; this usually requires 40 to 60 cubic centimetres of glucose solution. Should the emergency be acute, as in the case of a severe collapse or epileptic fit, a preliminary intramuscular injection of adrenaline (1 in 1,000) is given.

If the nasal tube has already been placed in position, a nurse may give the standard glucose feed while the doctor administers the intravenous injections of glucose; otherwise, as soon as the patient wakes, as a preventive against "after-shock" it is considered necessary to give some glucose tea with bread and butter.

In all the hospitals in which I saw this treatment carried out, one or more trolleys capable of being wheeled to the patient's bedside were kept stocked with the following articles and medicaments for emergency use:

Sterile water, kidney dishes, 10 cubic centimetre "Record" syringes, six needles for intravenous injections, three needles for intramuscular injections, one box of ampoules of 33% glucose (or "Osmon"), "Cardiazol", "Lobelin" and caffeine ampoules, ampoules of adrenaline (1 in 1,000), atropine solution, files for opening ampoules, lint and ether for disinfecting the skin, rubber tubes for arresting venous circulation, two mugs of glucose tea (150 to 200 grammes of glucose), glass funnels and rubber tubing, glycerine or liquid paraffin, a mouth gag, a 150 cubic centimetre glass syringe, litmus papers, a dessertspoon, and a sphygmomanometer.

Indications for Immediate Interruption.—The hypoglycæmic state must be terminated immediately if any signs or symptoms should arise which threaten the life of the patient. Such signs or symptoms are as follows.

1. **Epileptiform Attacks.** In the earlier days of the hypoglycæmic treatment epileptiform attacks were regarded as undesirable and dangerous. Experience, however, has caused a modification of this view, and in certain cases epileptiform attacks appear to have a favourable influence on the patient. Most observers now agree that the hypoglycæmia should be terminated if the fit occurs at the outset of the hypoglycæmic state, or at the end, when the patient is exhausted as the result of long coma. Should a second fit occur directly after the first, it must be regarded as a dangerous sign and treatment must be stopped immediately.

2. **Laryngeal Spasm.** Laryngeal spasm, fortunately, is an uncommon complication.

3. Cyanosis of the Mucous Membranes. Cyanosis of the mucous membranes, with weak pulse and with or without respiratory distress, indicates the need for immediate interruption of the hypoglycæmic state.

4. Cheyne-Stokes's Syndrome.

5. Abnormal Variations of the Pulse Rate. If the pulse rate shows marked fluctuations within a short space of time, or if the pulse is running and weak, the hypoglycæmic state should be terminated.

6. Cardio-Vascular Collapse.

7. Continuous Tonic Stretchings in Deep Coma (Frostig).

8. Other Signs. The hypoglycæmic state should be terminated if any signs appear which, individually or collectively, to the physician indicate danger.

All who are familiar with insulin treatment will agree that experience alone can teach one the right time to intervene.

Treatment on Waking.—Immediately on waking, the patient is rubbed down with a warm towel and given a fresh nightdress; hot bottles are put in the bed, the sheets of which have been changed. Then, having taken food, he is allowed to remain quietly in bed until it is time to return to the ward.

Possible Dangers and Complications.

Complications are becoming rarer as experience with this form of treatment progresses. They are minimized by the constant attendance of the physician throughout the whole of the treatment and by the special training of the nurses who assist. This training consists in giving the nurse an adequate idea of the nature of the treatment and in instructing her thoroughly in what danger signs to watch for.

While there is in this treatment an undoubted risk to life, the mortality rate has been kept very low indeed. (From Vienna three deaths have been reported in 200 cases, and from Switzerland two deaths in 500 cases.) From experimental work on animals it is assumed that the treatment causes no damage to the pancreas. Some alteration of sugar metabolism may be found in patients who have undergone hypoglycæmic therapy. If the heart is normal at the outset, there should be no cardiac symptoms; cardiac stimulants are seldom given during treatment. The occurrence of bronchitis and pneumonia would point to careless nursing. "After-shock", or an attack of unprovoked hypoglycæmia, has been known to occur several hours after the morning's treatment is over and the patients have been returned to their wards. It cannot always be prevented, and so the possibility must always be remembered and anticipated by the vigilance of the nursing staff. Should such an attack occur, the patient is immediately given intravenous injections of glucose followed by a rich carbohydrate meal. Epileptic fits have been known to occur as the first warning of a patient in the coma of "after-shock". No patient, therefore, should be left unobserved during the afternoons and evenings of his treatment days.

The Course of Treatment.

Theoretically, the patient undergoing daily hypoglycæmic shocks should commence to have periods of lucidity. These periods should become longer and longer as treatment proceeds, until finally the patient remains completely lucid. This uninterrupted type of improvement is sometimes seen; and when the patient has gained lucidity and insight and is free from delusions and disordered thinking, he is gradually weaned off insulin and discharged.

The majority of patients do not progress in this ideal way. Some may not respond at all, in which case, after they have been allowed thirty to forty shocks, the treatment is terminated and the patient set down as unresponsive. Other patients may show improvement up to a point only. The treatment is continued for a short time after this point is reached and then gradually withdrawn. In other words, after the treatment has been given a reasonable trial it is discontinued if the patient shows no improvement; so long as improvement is shown, the treatment is carried on either until the improvement goes no further or until the patient achieves a complete remission.

It should be emphasized again that the daily reactions of the patient, both mental and physical, may present the widest variations. Not only does the patient sometimes fail to go into a state of shock, but the shock may vary in its intensity with the same dose of insulin and may at certain times cause a "reactivation" of the psychosis. That is to say, a patient who is becoming quieter and more lucid in the insulin-free periods may show the old psychotic symptoms, often in an exaggerated form, while in the hypoglycæmic state. Sakel and his colleagues believe it dangerous to interrupt the hypoglycæmia when the patient is in a reactivated state, since they consider that the patient is then liable to remain in this state. If, on the other hand, a patient previously stuporose becomes, in the hypoglycæmic state, excited and restless, then Sakel suggests immediate interruption of the shock, believing that the patient thereby will tend to remain less stuporose. My own observations did not serve to impress me with the importance of these ideas which the Viennese psychiatrists appear to emphasize.

A psychiatrist engrossed in the treatment of numerous patients by the insulin method may acquire intuitive ideas regarding their reactions to treatment, and so he may occasionally forecast the ultimate result; but it has not been possible so far to formulate any rules whereby one could know, for example, whether a patient whose shocks were long and deep would make a better ultimate recovery than one whose hypoglycæmic reactions were more varied in character. To a great extent "wait and see" must always remain the most important corollary to an empirical treatment.

Comments.

To the unfamiliar observer hypoglycæmic shock therapy may look particularly dangerous and

somewhat cruel. One should not, however, judge by appearances alone. In the hands of a competent physician who has familiarized himself with all aspects of the treatment, the dangers are often more apparent than real, because so long as the doctor is in constant attendance, the patient can be brought to consciousness within a minute or two. It should go without saying that the psychiatrist who undertakes this treatment will tread warily until he is personally familiar with it. He will, of course, err on the side of safety and tend to terminate the coma too early, or to become alarmed at symptoms which a more experienced physician would allow to pass. In such cases the patients may not derive full benefit from the treatment; but as the physician gains confidence and allows the shocks to go deeper and to last longer, beneficial results should quickly follow.

From the patients' point of view the treatment is neither perilous nor painful. Amnesia prevents them from remembering any of their more distressing symptoms. Almost invariably patients gain weight and begin to feel more physically fit. This, together with the return of lucidity, more than compensates for any initial discomfort they may have experienced.

Results.

Statistical tables may be dangerous implements when pressed into service by the enthusiast or when used defensively by the sceptic. They can be made to magnify or to mislead, and those among us who realize the variety of psychiatric factors which may influence but cannot be expressed by statistics, will surely place little confidence in the mere tabulation of figures. I believe that to watch the progress of patients from day to day while they are under treatment and to talk to patients who have achieved remissions, will provide more eloquent proof of the benefit of treatment than any lists of percentages can show. At the same time, in an exposition such as this, a few simple figures reflecting the results of treatment must be given.

The earlier figures from Vienna showed that, of 58 recent schizophrenics, 88% achieved good remissions and were able to leave hospital and to resume their lives in the community. Of these, Sakel and Dussik⁽¹⁵⁾ claimed that 70% were cured, that is, that they had complete rehabilitation of the personality and capacity for normal work. Nine of the patients subsequently relapsed, and three of them were again discharged after further treatment. Of 46 patients in whom the schizophrenic illness was of longer duration, that is, of more than six months, 19.6% achieved complete remissions and 47.8% attained social recovery, being able to be returned to their homes. Six of these patients subsequently relapsed.

A word may be said regarding these relapses. Without doubt in earlier days patients were not given the prolonged treatment that they now receive. Treatment was stopped before the remis-

sions had become permanent. Frostig⁽¹⁶⁾ and his co-workers emphasize this in comparing their results at Otwock with those of Professor Rose at Wilna. They claim that Professor Rose did not achieve the same proportionate number of good remissions as were obtained at Otwock (a) because the number of shocks were insufficient or (b) because the patients were not in a hypoglycemic state for a sufficient number of hours.

Frostig⁽¹⁶⁾ in one small series of selected patients whose psychoses were of less than twelve months' duration, obtained complete remissions in 87%; but with patients of longer standing complete remissions totalled only 20%.

Müller⁽¹⁷⁾ who has summarized the results of treatment obtained in seven Swiss hospitals, including Münsingen, finds 76% of full remissions in patients whose illness has lasted only six months, 68% of full remissions when the illness has lasted up to eighteen months, and 48% of full remissions in patients irrespective of the duration of the psychosis. Reporting later on a slightly larger series of patients culled from ten Swiss hospitals, Müller⁽¹⁸⁾ reports 68% of full remissions and 85% of improvements among patients with schizophrenia of up to eighteen months' duration. The patients with schizophrenia of longer standing had practically no full remissions, but 45% showed improvement.

Dr. A. Soininen, Director of the Kellokowski Sairaala, a mental hospital near Helsingfors, had, when I visited him early this year, treated 70 schizophrenics. He claimed that 63% of patients from an unselected group were improved and cured. Of patients whose illness was of less than eighteen months' duration, 75% of the males and 50% of the females achieved complete remissions, while 35% of the longer-standing patients showed benefit and improvement from the treatment.

Put more simply, by the proper use of the insulin shock treatment one is now able to anticipate some 70% to 80% full remissions in schizophrenic patients whose illness is of less than six months' duration, and approximately 60% of full remissions in those whose mental disorder has persisted for not more than eighteen months at the time of treatment. For patients who have been ill for longer than eighteen months the chance of achieving a remission diminishes rapidly as the length of the illness increases and as defect symptoms are manifest; but while different workers give different figures for the remission rate among these patients of longer standing, all are agreed that, apart from the not altogether negligible number who do seem to recover, nearly 50% show varying signs of improvement.

Müller⁽¹⁸⁾ believes that the quality of the insulin-produced remission is better than the quality of the spontaneous remission; in the former the patients are more cooperative, are willing to discuss the psychosis, and show an interest in the treatment; they seem to take a pride in their recovery. He

believes that the insulin-produced remission is psychologically different from the spontaneous type, in that lucidity and insight may come quickly and that the patients do not show that painful, step-by-step process of, as it were, climbing back to reality seen in the so-called spontaneous remissions. Patients after the administration of insulin have sometimes said that they felt as though a veil had been lifted from them. If such is the case for insulin, who can deny its value in the treatment of schizophrenia?

"Cardiazol" Convulsion Therapy.

While Sakel in Vienna was giving his first patients tentative hypoglycemic shocks, Dr. Ladislaus von Meduna⁽¹⁸⁾ was experimenting with camphor on animals in the laboratory of the Royal State Mental Hospital in Budapest. He was producing artificial epileptic fits in guinea-pigs.

Epilepsy has always had rather a fascination for medical men; one of the oldest known diseases, it is yet one of the most mysterious. Earlier generations once thought that epilepsy had a divine origin, that it was visited upon man as the expression of divine wrath; but Meduna is probably the first physician who ever thought of applying epilepsy to cure another form of illness. In a way his idea was fantastic; but so was old Wagner-Jauregg's idea of using malaria to cure neuro-syphilis.

Meduna, like Wagner-Jauregg before him, was not frightened of the fantastic. He went boldly forward, first with animals and then with men, seeking a harmless substance which could be used to provoke epileptic seizures at will. Now he knows the joy of seeing his hitherto hopeless patients get well, of having them come to see him six months, a year, even two years after their discharge from his hospital.

Meduna is a modest man. He writes very little but works very hard, and has never sought the plaudits of popular approval. He thinks his treatment is still tentative and a little crude, and says that "it is only a first step on the as yet unaccustomed biologic road of influencing the schizophrenic process".⁽¹⁹⁾

Biological Antagonism.

From clinical records and observations Meduna has come to embrace the belief that in the pathological development of schizophrenia and epilepsy there exists a fundamental biological antagonism which can by artificial means be made to serve therapeutic ends.

Observations carried out by Nyiro and Jablonsky in 1929 at the Royal State Mental Hospital, where Meduna was working, showed that if epileptic patients developed schizophrenia the fits became rarer and finally ceased. They found that the epileptic fits ceased after the onset of the schizophrenia sixteen times more often than they tended to disappear spontaneously. While Meduna was considering the therapeutic implication that these figures seemed to contain, Steiner and Strauss

approached the problem from the other direction and found that in a review of six thousand cases of schizophrenia epilepsy occurred so infrequently as to cast a doubt on the correctness of the diagnosis.

Meduna's belief might have been strengthened had he known that, even before the work of his two colleagues at Budapest, an astute observer had quoted several cases in which he suggested that epilepsy might be a prodromal symptom of *dementia præcox*, as he had observed the condition to commence with a series of fits, which gradually ceased as the schizophrenic symptoms became manifest. The work of Golla on the acid-base equilibrium in schizophrenia, contrasted with the observations of Temple Fay on epilepsy, might serve to give further point to Meduna's belief in the biological antagonism.

From Camphor to "Cardiazol".

Having once conceived this idea of a biological antagonism between schizophrenia and epilepsy, Meduna, following the work of Muskens and repeating it in his own laboratory, began to use intramuscular injections of camphor in oil. The fit-producing dose varied from eight cubic centimetres to thirty cubic centimetres, and so slow was the absorption of camphor that the fit did not occur for from one to two hours after the injection. The unwieldiness of such an injection and the associated pain, together with the time taken to produce the fit, led Meduna to a further search for some better product than camphor; and at last he discovered "Cardiazol".

Camphor and "Cardiazol" (penta-methylene-tetrazol) are only distantly related chemically, but their pharmacological effects are similar. "Cardiazol" is soluble in water and may be used intravenously, when its action is extremely rapid. If it is given in the right quantity and with sufficient rapidity, an epileptic fit is produced within five to thirty seconds after the injection. "Cardiazol" is not cumulative in its action and, it is claimed, has no disadvantageous effects upon the normal heart. It is rapidly excreted, and patients who have been given much more than the fit-producing dose have shown no distressing symptoms.

Rapidity of Injection.—In the course of his experiments with intravenous injections of "Cardiazol", Meduna found that fundamental in the production of the fit was the rate at which the "Cardiazol" was injected. One could give twice the dose very slowly without producing any fit at all. He found that that was the case whether he used a 10% or a 20% solution of the drug; and by means of trial and error he decided that an injection given at the rate of one cubic centimetre per second was the minimum speed for producing a fit. Thus, if through too small a dose or through a correct dose given too slowly, the patient fails to respond with a fit, it is useless at the time to give a further injection, and the patient is simply allowed to wait until the following day, when such defects in technique can be remedied.

These small but important aspects of technique were demonstrated to me by Dr. Meduna when I was in Budapest early this year and when I saw about eighteen patients undergoing convulsion therapy. I also had the privilege of giving a number of the injections myself, and later of examining the patients. The fits are typical and differ in no way from the major epileptic attacks one sees in the epileptic wards of a mental hospital.

Routine Technique.

In Budapest, the "Cardiazol" treatment is given on alternate days. The patients are taken during the morning to a special ward where the beds are screened from each other. An attendant with a tampon for the mouth stands behind the head of the patient's bed; another stands at the side of the patient's bed to prevent the patient falling out or being injured during the fit; a third attendant, handing the doctor a charged syringe, steadies the patient's arm and ties a rubber band around it to arrest the venous circulation. A second doctor stands at the foot of the bed with a stop-watch to time the injection and the fit and to make clinical observations. A moment before the injection is begun, the bed-clothes are stripped back and the pyjamas are undone at the waist and at the neck. The "Cardiazol" is then injected after the manner customary with intravenous medication, due attention being paid to the speed at which the solution enters the vein.

Within a few second of the injection, or sometimes a fraction of a second before the needle is withdrawn, the fit commences with a few clumsy "flight movements" and twitchings. The patient acquires a look of intense anxiety and is then already unconscious. It is only a matter of a few seconds before the tonic spasm starts, and with this the mouth opens widely. The attendant places the tampon in the mouth and holds it there until the patient's jaws close convulsively upon it. The usual clonic manifestations follow, and these finally give place to the stertorous breathing which marks the termination of the fit. The tampon is removed from the mouth. The patient is fixed firmly in the bed by means of a crossed sheet and is left to recover consciousness gradually within the next fifteen to thirty minutes. The patient is generally confused and amnesic, and so is allowed to fall into a natural sleep. Midday dinner is later served to the patients in the usual way, but they are allowed to remain in bed until the middle of the afternoon. On the alternate days, when no "Cardiazol" is given, they attend the occupational therapy classes or take part in outdoor work or exercises.

Using a 10% solution of "Cardiazol", Meduna commences with an injection of five cubic centimetres and increases each injection by one cubic centimetre until the fit is produced. Should five cubic centimetres prove sufficient, the dose for that particular patient is not increased. One may use a solution of greater strength, but in any case Meduna suggests commencing with 0.5 gramme of

"Cardiazol" and, if necessary, increasing each succeeding dose by 0.1 gramme. The intravenous route is the method of choice, but if this is difficult owing to deeply concealed veins, the injection may be given intramuscularly, the dose then being increased by from 0.3 gramme to 0.5 gramme above the intravenous dose.

It is not possible to state the number of convulsions necessary to bring about a remission. Meduna has had patients in whom a remission was achieved after two or three fits, and other patients who commenced to improve only after twenty or more seizures had been induced. He stresses the fact that convulsion treatment should not be terminated too soon. It is unwise to stop the treatment as soon as a remission begins; relapses are likely to occur. He urges the physician to err on the side of safety and to induce at least three (preferably more) seizures after a good remission has been brought about.

Comments.

Variations in the type of seizure may be observed; it may start in a typical Jacksonian manner and spread gradually over the whole body. Meduna has noted the occurrence of epileptic equivalents—psychical disturbances and twilight states lasting from ten to fifteen minutes. So far he has not been able to draw any prognostic inferences from the occurrence of these variations. He believes, however, that, as a general rule, the more easy it is to provoke a fit, the better is the ultimate prognosis. This inference is drawn from a review of 110 treated patients.

Meduna believes that in the early stages of schizophrenia the morphological changes in the nervous system are reversible; at this stage it is possible to bring about a remission through suitable treatment. When later the patient shows signs of permanent mental deterioration or of dementia, the biological processes have become irreversible and, although by large doses of "Cardiazol" it is possible to produce an epileptic response, this is without beneficial effect on the nervous system. Meduna had been unable favourably to influence schizophrenic patients of more than four years' standing.

The treatment is simplicity itself and may be undertaken by any physician who will familiarize himself with the technique. It is needless to say that no patient suffering from any acute bodily illness or chronic disease affecting the heart, blood vessels, lungs or kidneys should be subjected to convulsion therapy.

To the onlooker this treatment may appear somewhat "cold-blooded"; but one should not forget that at the very onset of the seizure the patient becomes unconscious and is later amnesic, in the same manner as if given a general anaesthetic for a surgical operation. Nor should one lose sight of the fact that schizophrenia is an illness from which few patients recover spontaneously, and that, therefore, the use of any treatment which holds promise of a

remission (if it is too early to speak of a "cure") should have ample justification.

Results of "Cardiazol" Treatment.

In 50% of unselected cases, in which the length of illness has varied from one week to ten years, a good remission has been obtained. In especially early cases, before the onset of permanent symptoms of mental deterioration, the reaction to this form of treatment has been most favourable, and Meduna claims to have brought about a remission in 80% of such cases. Reviewing his results in individual cases, he finds that a good response may be anticipated in schizophrenics whose symptoms have not persisted for more than four years; but that he has failed absolutely to produce any good results in patients whose symptoms have persisted for a longer time. The best responses to "Cardiazol" have been achieved in the catatonic and hebephrenic types of schizophrenia.

Though "Cardiazol" therapy is now being used in certain hospitals in Switzerland, Greece, India, America and the Soviet Union, and though a number of physicians have reported favourably to Meduna in personal communications, I have not yet seen any published results, and until these are forthcoming Meduna's figures must stand, a challenge to the modern psychiatrist confronted with the schizophrenic problem.

Conclusions.

Although for the purpose of clarity I have described the modes of treatment by insulin and "Cardiazol" with an exactitude which might imply that they were established methods, it should be emphasized that neither has passed beyond the experimental stage, that variations in technique are constantly used by different workers, and, above all, that both forms of treatment are highly individualistic. It is not too much to say that, with some workers, good results are directly proportional to their enthusiasm for the treatment; this might apply equally to any form of healing. Enthusiasm is stimulating; it gives courage and energy; it creates alertness and stimulates initiative. He who essays to treat schizophrenic patients with insulin or "Cardiazol" in a sceptical or timorous frame of mind, terminating treatment too soon, or not adapting its variations to meet the differing needs of individual patients, will surely fail to achieve the successes of his more virile and enthusiastic colleagues.

It is to be expected that, as knowledge increases, some more or less set scheme of treatment may be evolved. At present some workers are experimenting with a combination of both forms of treatment. Freudenberg and Müller believe that the epileptic attacks which are sometimes brought about in hypoglycemia are beneficial, and for this reason they are now using "Cardiazol" in combination with insulin in certain patients whose response to insulin alone appears poor. In such cases the two forms of treatment are used alternately. This is justified

upon experimental grounds, for it has been found that whereas insulin is especially beneficial in the paranoid types, "Cardiazol" is likewise most useful in the catatonic and hebephrenic types of schizophrenia.

Whichever method is chosen, one cannot but be impressed by the results obtained. In order to know just how gratifying it is to see in hitherto hopeless patients the quick return of insight and lucidity, to watch the train of thought become more orderly, the judgement more reliable, the emotional responses more acute, and voluntary activity take the place of apathy, one must witness patients achieving remissions as the result of treatment with "Cardiazol" or insulin. The percentage of such remissions is far higher than has hitherto been recorded in connexion with any other form of treatment—far higher than any series of spontaneous remissions. It is obvious that at present no one can know whether such remissions or any fraction of them will be permanent, just as it is obvious that after the removal of a malignant tumour one cannot know whether the patient is cured until a certain time has elapsed. Such uncertainty as to the end-results of treatment should not detract from the value of the treatment as such, nor should it prevent the surgeon and the psychiatrist from taking full advantage of the therapeutic methods at hand.

It is well known that certain forms of schizophrenia possess a tendency to remission, and that nearly any form of active treatment in which the patient receives special nursing and much individual attention may bring about a remission in the earlier months of any schizophrenic illness; so that the 86% of good remissions after insulin treatment reported by Sakel and Dussik, and the 80% attained with "Cardiazol" by Meduna in very early cases are not actually so striking as the percentage of remissions achieved in unselected cases. The true value of "Cardiazol" and insulin is seen, therefore, in the number of remissions brought about in the general run of patients whose illness has in some instances lasted a considerable time—48% of remissions in the insulin-treated patients (Müller) and 50% in those treated with "Cardiazol" (Meduna). These figures are more than twice as high as those accepted for so-called spontaneous remissions.

No useful purpose would here be served by discussing the various theories (the theories of detoxication, of humoral action, of cellular blockage *et cetera*) which have been advanced to explain the working of insulin. Our accepted ignorance of the patho-biological processes underlying schizophrenia must relegate such explanations to the sphere of speculation, which is already far too great in our psychiatric domain. The results obtained by "Cardiazol" would seem to rob insulin of any specific effect, unless the epileptic states which are brought about by both methods—in the one case incidentally and in the other deliberately—cause a similar and apparently beneficial change in the biochemical milieu of the human organism. I am of

the opinion that neither agent is entirely responsible for the remission achieved, but that each serves to bring the patient, by means of shock as profound as that of impending death, into touch with those around him to an extent that he can, through individual attention and personal attachment to his physician, be brought into contact with reality. This "transference" on the doctor, once the structure of the autism is broken through, is used not as in psycho-analysis, by burrowing through unconscious resistances to unearth infantile fixations and conflicts, but to promote definite synthetic healing by the solution of difficult adaptations, by the inculcation of normal habits and by the establishment of an affective relationship with the surroundings.

In surgical work, the after-treatment (dressings, submammary injections of saline solutions, sedatives, nutrition *et cetera*) is frequently as important as the operation itself; in fact, the latter is essential for the success of the former. So it is in the treatment of schizophrenia. It is surely not sufficient to induce by rule of thumb a certain number of epileptic seizures by the exhibition of "Cardiazol" or of hypoglycæmic shocks by heroic doses of insulin. Ancillary forms of treatment must be applied; and, consciously or unconsciously, they are applied in all successful cases. Careful dietetic and routine medicinal measures suited to particular requirements must be invoked. Occupational and recreational therapy should be made available and adapted to the needs of each particular patient, helping him to integrate his behaviour upon a more stable level by building up his self-respect and by making reality more interesting than fantasy, so drawing him out of his mental isolation into the sphere of social contacts wherein he may develop new attitudes—in a word, by making the whole process reeducational.

A knowledge of the pre-psychotic symptoms and personality make-up of the patient, together with a clear-cut picture of his social background supplied in the report of the social service worker, will be invaluable to the doctor who sets out to follow up the immediate benefits of insulin or "Cardiazol" treatment with a constructive psychotherapy, in an attempt to take his patient from the stage of remission to that of a permanent restoration of mental health. To use again a surgical analogy: an amputation is performed with a knife, but the success of the operation depends upon the man who uses that knife; likewise, the success of the psychiatric treatment here described depends very largely upon the man who undertakes it.

Summary.

1. The nature of the schizophrenic problem is indicated, distinctions being drawn between the terms *dementia præcox* and schizophrenia.

2. The question of spontaneous remission in schizophrenic cases is considered. Kraepelin taught that approximately 12.6% of cases of *dementia præcox* achieved remission, but of these the majority

broke down again. Bleuler's conception of schizophrenia is wider, and includes cases in which the psychosis is episodic in character and does not recur. Twenty *per centum* is the accepted figure for spontaneous remissions among schizophrenic patients. Reasons are given why such a figure may not be accurate.

3. Older forms of empirical organic treatment are reviewed shortly, particularly pyrotherapy and prolonged narcosis, both of which are still used extensively in England and in the Continental hospitals.

4. An account of the treatment of schizophrenia by insulin hypoglycæmia, as introduced in Vienna by Sakel, is given, and extended reference is made to the same treatment in other countries in the hands of Müller, Frostig, Soininen and others. The technique and its modifications are described fully and its dangers are listed. The results are summarized as follows: (a) full remission may be obtained in 70% to 80% of cases in which the illness has lasted no longer than six months; (b) full remission may be obtained in 60% of cases in which the illness has not persisted for longer than eighteen months; (c) 50% of the older cases show varying degrees of improvement.

5. The treatment of schizophrenia by the "Cardiazol" convulsion method, introduced in Budapest by Meduna, is described, together with the technique adopted.

6. Some evidence is quoted giving support to Meduna's theory of a biological antagonism existing between schizophrenia and epilepsy, upon which he bases his treatment.

7. The results of the "Cardiazol" convulsion therapy are summarized as follows: (a) in very early cases of schizophrenia 80% of remissions were obtained; (b) in unselected cases, in which the illness had lasted from one week to ten years, 50% gained a remission; (c) in patients whose psychosis was of more than four years' standing, Meduna found that he had not succeeded in obtaining a beneficial result.

8. Conclusions are drawn from both methods of treatment. It is noted that the epileptic state is common to both procedures, and a tentative suggestion is put forth that this may act by changing the biochemical milieu of the human organism in a beneficial way not yet understood, or that it may act merely as a shock, serving by its very intensity to bring the patient into a state of dependency, so that he can obtain benefit from the individual attention of those around him, together with the commonsense psychotherapy consciously or unconsciously applied by the doctor.

9. A plea is put forward for the use of these organic forms of treatment, in order to break down the psychotic barrier and so allow the ancillary methods of treatment to be applied, much in the same way as a surgeon operates first and completes his work by his skilled attention to the after-treatment.

10. The results obtained by the methods of treatment herein set down are far and away superior to those ever previously reported, and it is the writer's belief that in capable and enthusiastic hands they will be the means of opening an entirely new and optimistic chapter in the hitherto sad saga of schizophrenia.

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THE ANATOMY OF CAPSULAR VASCULAR DISEASE.

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Introduction.

Few regions in the brain present such excellent opportunity for widespread damage from local lesion as the internal capsule, and it is probably for this reason that the subject has received so much attention. Now such a lesion may be of a thrombotic or embolic type, nicely localized to the capsule itself, or it may be of an explosive, hæmorrhagic nature, spreading from an artery supplying a neighbouring structure. Any consideration of the arteries which may be involved in capsular disease must therefore include both the vessels to the capsule and those to the structures around.

The hæmorrhagic type of lesion appears to be the more frequent, possibly because its effects are more dramatic and its victims come sooner to autopsy. In any case, it has received more attention from clinical observers, and of these one of the earliest and one of the most acute, was Charcot.⁽¹⁾ This writer noted that cerebral hæmorrhage occurred most frequently in the base of the external capsule anteriorly, and spread thence through the lenticular nucleus to the internal capsule, and he labelled the point of origin the "site of election" for cerebral hæmorrhage. Charcot instigated Duret⁽²⁾ to investigate the arterial supply to the brain, and this writer produced the first complete monograph on the subject. It is known that Duret's paper contained many errors, and even in the same year Heubner⁽³⁾ contradicted many of his findings. Later, Kolisko⁽⁴⁾ introduced further corrections. In 1909 Beever⁽⁵⁾ produced a most exhaustive treatise, based upon examination of about one hundred brains, providing the first reasonably accurate survey of the maximum distribution of the major vessels; but he paid little attention to the details of distribution of the smaller arteries.

All these authors had relied upon injection of the arteries with coloured pigments, and, having sectioned the brain, the identification of individual vessels by matching of adjoining sections. In 1909, however, Aitken⁽⁶⁾ published a series of beautiful figures of the arteries to the basal ganglia based upon actual dissection of the individual vessels. His method, while tedious, is by far the more accurate, and has been employed in this investigation.

Each of the above-mentioned writers has made some distinct contribution to the subject of the present inquiry. Duret was the pioneer and is remembered in the continued use of his terms "lenticulo-optic" and "lenticulo-striate" as applied to some of the basal branches of the middle cerebral artery. Heubner's chief contribution was his account of the basal branch of the anterior cerebral artery, which sometimes bears his name, and his mention of the distribution of the anterior chorioidal artery to the internal capsule. Kolisko presented the first attempt at a study of the complete field of supply from the anterior chorioidal artery, while Beever supplied the first complete survey of the maximum distribution of the cerebral arteries. Finally, Aitken provided the first precise account of the courses of the individual arteries; he corrected and extended the observations of previous workers, and he questioned the existence of the "lenticulo-optic" artery of Duret.

The present paper is the outcome of realization of the fact that clinicians, generally, accept and teach Duret's original findings with little or no appreciation of the corrections which have been introduced since 1874. They retain, for example, the term "lenticulo-striate" artery, although the name is misleading, implying some distinction of lenticular nucleus and *corpus striatum*, and has been replaced in anatomical teaching by the title "lateral striate arteries"; and they still discuss the

ILLUSTRATIONS TO THE ARTICLE BY DR. A. A. ABBIE.

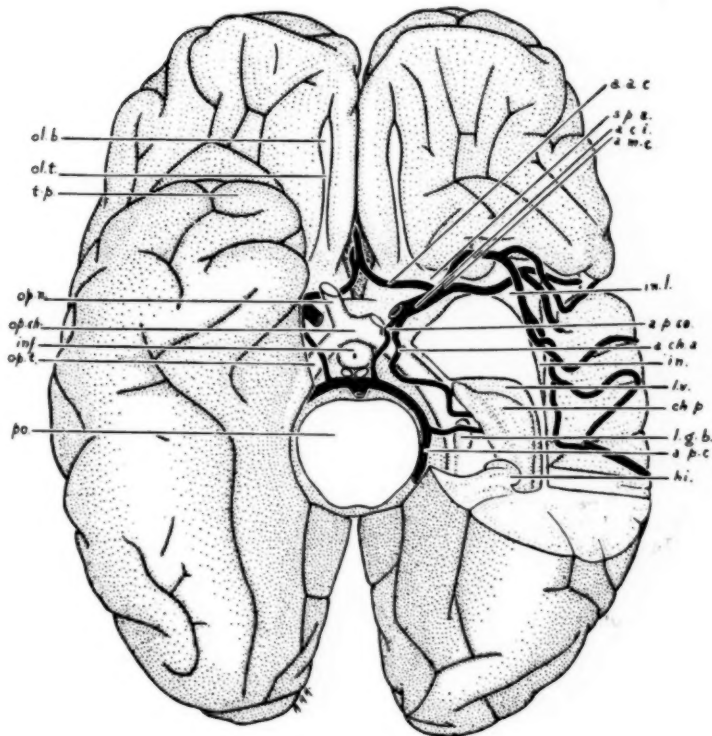


FIGURE I.

LEGENDS TO ILLUSTRATIONS.

FIGURE I.—General view of the base of the brain for purposes of orientation. The left temporal lobe has been almost completely removed, exposing the inferior horn of the lateral ventricle and the origins and courses of the main arteries discussed in this paper.

FIGURE II.—A: Enlarged view of the portion exposed by dissection in Figure I. The internal carotid artery is pinned forward to show the medial and lateral striate arteries and the posterior communicating and anterior chorioidal arteries and their branches. B: The internal carotid and posterior cerebral arteries have been removed, and the medial striate and posterior communicating arteries are pinned aside. C: The medial striate, posterior communicating and anterior chorioidal arteries have been removed, leaving only their basal branches. The brain substance has been stripped off through the external capsule, leaving the basal mass and portion of the anterior perforated substance intact. The ependyma has been removed from the roof of the inferior horn of the lateral ventricle to expose the optic radiations. D: The *crus cerebri* has been followed dorsally to its continuation with the internal capsule, and the basal mass has been cut horizontally to disclose its subdivisions. The arteries have been preserved. (Compare with Figure IV.) NOTE: See text for explanation of artery marked "X".

FIGURE III.—A: Dissection from the lateral aspect of the right hemisphere of the same brain. The opercula, insula and

external capsule have been stripped away, exposing the putamen. Note the concentration of lateral striate arteries at the base of the external capsule. B: The lateral striate arteries have been followed through the putamen to their termination, and the *corona radiata* has been cut back sufficiently to expose the caudate nucleus. Note especially the deep optic branch (a.d.op.) of the middle cerebral artery. C: The whole of the lenticular nucleus has been stripped away to expose the internal capsule; the outer broken line represents the approximate disposition of the putamen, the inner broken line that of the *globus pallidus*. Note the medial striate artery to the anterior limb, the posterior communicating artery to the genu, and the anterior chorioidal artery to the posterior limb of the internal capsule. Note the optic branch (a.op.ch.) from the anterior chorioidal artery for the supply of the infra-lenticular and retrolenticular portions of the internal capsule.

FIGURE IV.—Horizontal section through the thalamus, internal capsule and basal ganglia. The fields of arterial distribution are indicated by broken lines.

FIGURE V.—A series of four coronal sections through the basal ganglia and internal capsule to illustrate the arterial distribution (semi-schematic). A: Through the anterior limb of the internal capsule. B: Through the genu. C: Through the posterior limb. D: Through the retrolenticular portion of the internal capsule.

ILLUSTRATIONS TO THE ARTICLE BY DR. A. A. ABBIE.

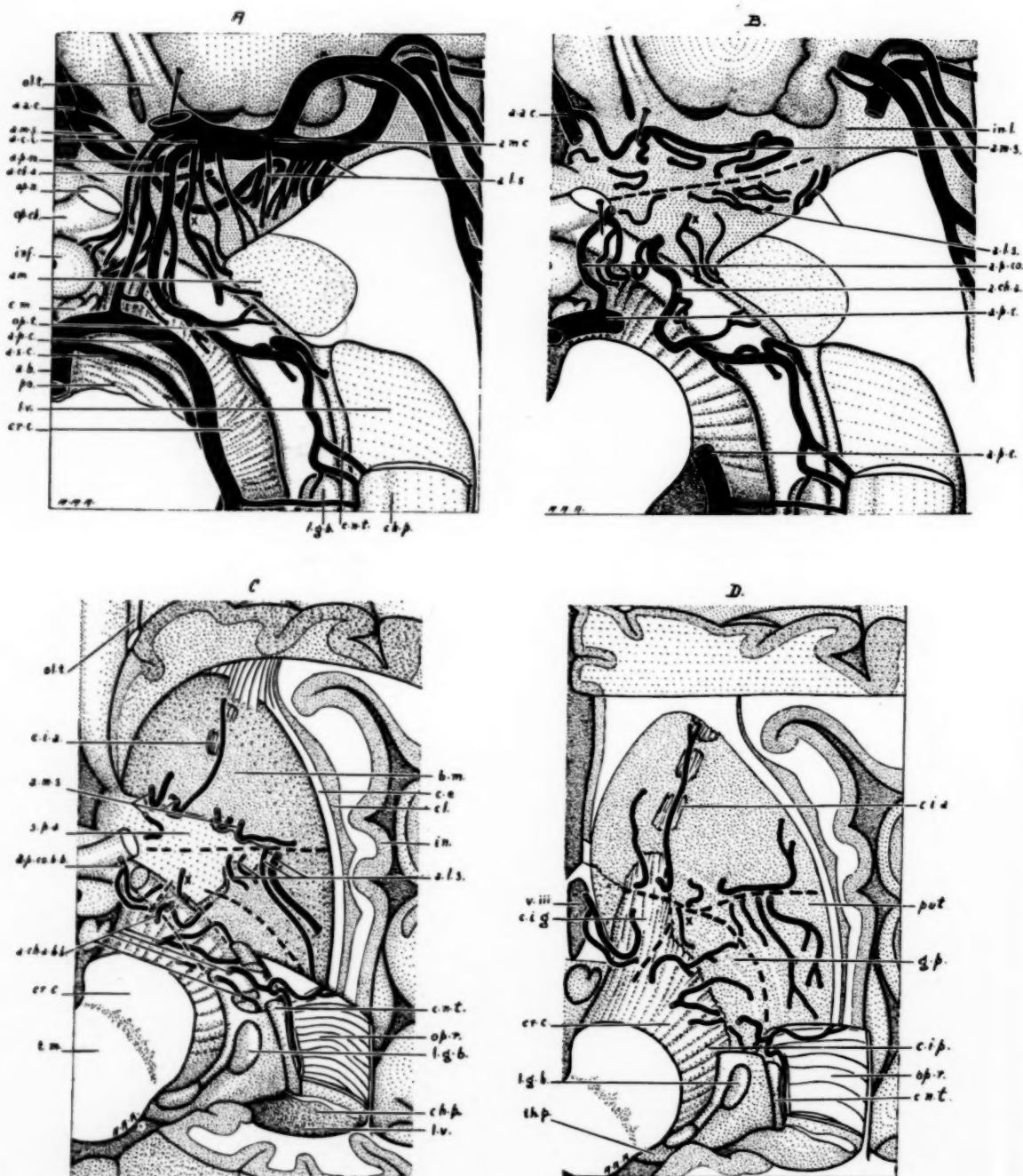


FIGURE II.

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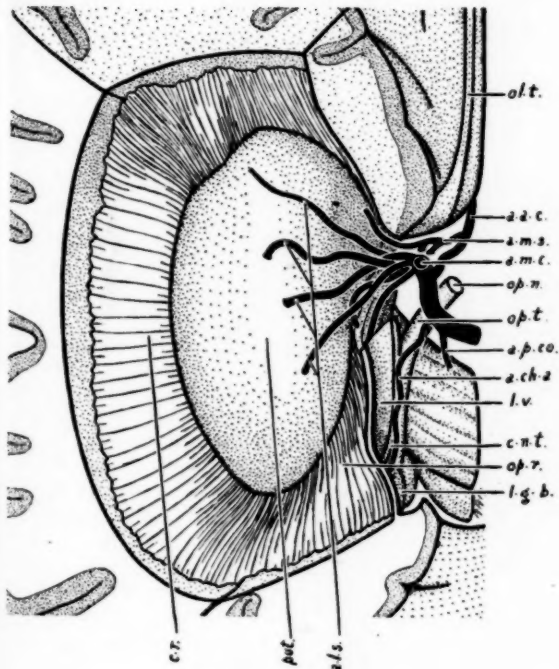


FIGURE III, A.

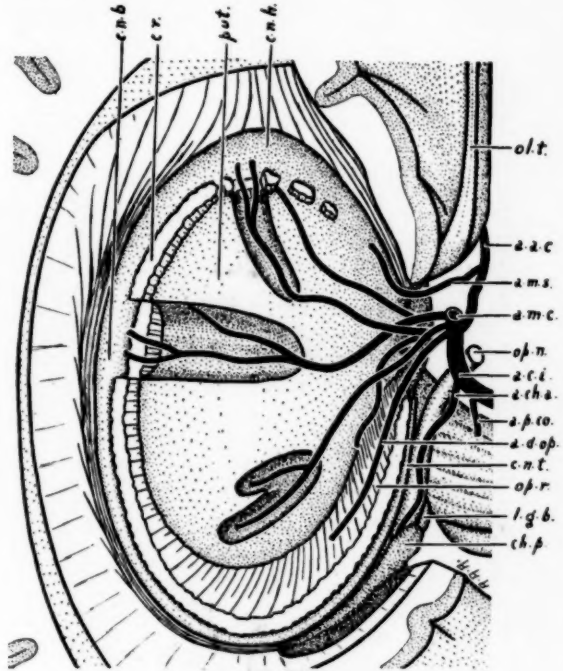


FIGURE III, B.

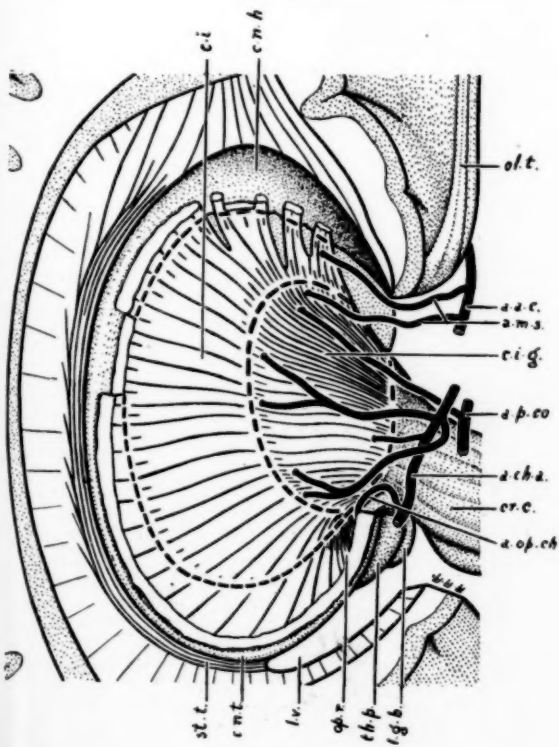


FIGURE III, C.

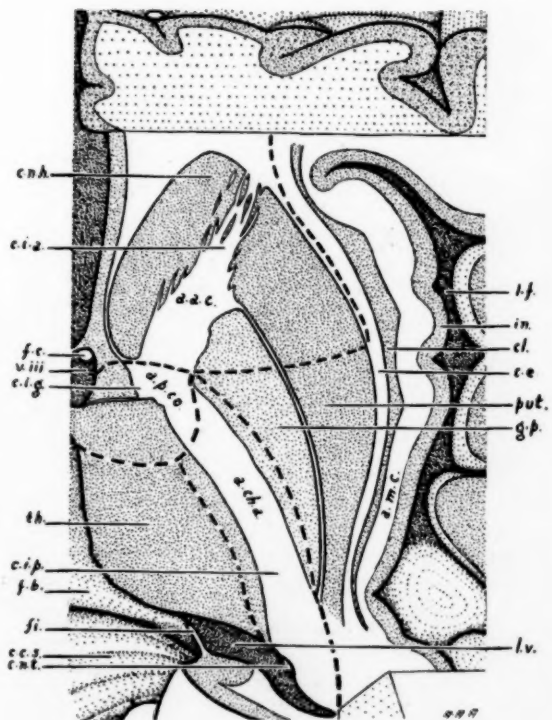


FIGURE IV.

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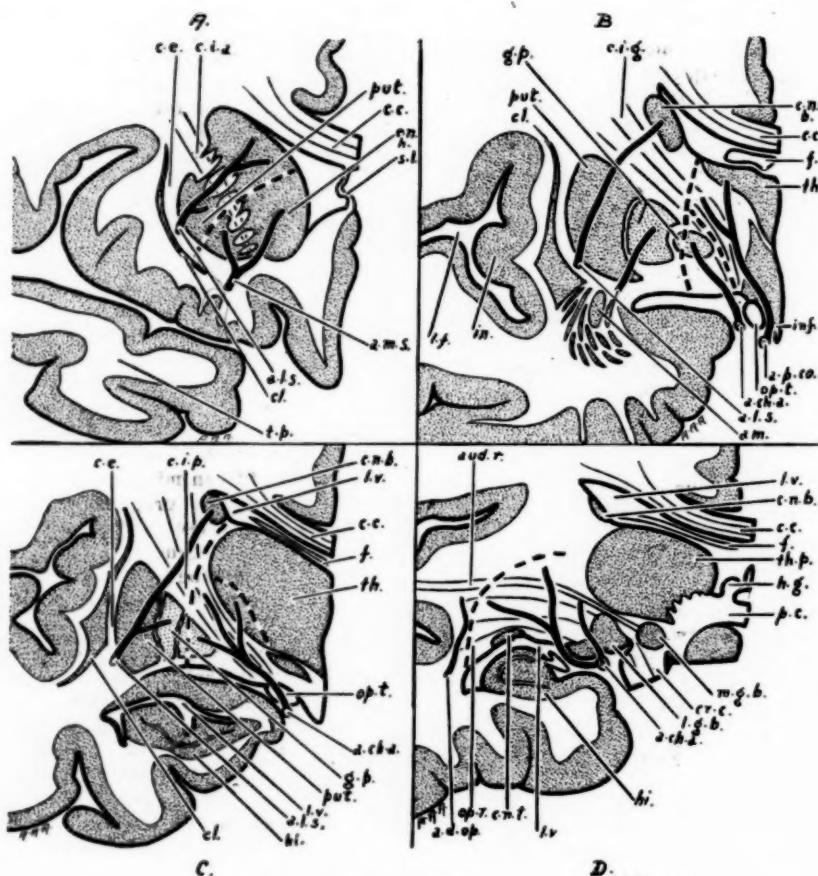


FIGURE V.

ABBREVIATIONS EMPLOYED IN THE FIGURES.

a.a.c., anterior cerebral artery; a.b., basilar artery; a.c.l., internal carotid artery; a.c.h.a., anterior chorioidal artery; a.c.h.a.b., basal branches of anterior chorioidal artery; a.d.op., deep optic branch of middle cerebral artery; a.l.a., lateral striate arteries; a.m.c., middle cerebral artery; a.m.s., medial striate artery; a.op.ch., optic branch of anterior chorioidal artery; a.p.c., posterior cerebral artery; a.p.co., posterior communicating artery; a.p.co.b.b., basal branches of posterior communicating artery; a.s.c., superior cerebellar artery; am., amygdaloid nucleus; aud.r., auditory radiations; b.m., basal mass; c.c., corpus callosum; c.c.s., splenium of corpus callosum; c.e., external capsule; ch.p., chorioidal plexus; c.l., internal capsule; c.l.a., anterior limb; c.l.g., genu; c.l.p., posterior limb; cl., claustrum;

c.m., mamillary body; c.n.b., body of caudate nucleus; c.n.h., head of caudate nucleus; c.n.t., tail of caudate nucleus; c.r., corona radiata; c.r.c., crura cerebri; f., fornix; f.b., body of fornix; f.c., column of fornix; h., hippocampus; g.p., globus pallidus; h.g., habenular ganglion; hl., hippocampus; in., insula; in.l., limen insular; inf., infundibulum; l.f., lateral fissure; l.g.b., lateral geniculate body; l.v., lateral ventricle; m.g.b., medial geniculate body; ol.b., olfactory bulb; ol.t., olfactory tract; op.ch., optic chiasma; op.n., optic nerve; opr., optic radiation; opt., optic tract; p.c., posterior commissure; po., pons; put., putamen; s.l., septum lucidum; s.p.a., substantia perforata anterior; st.l., stria terminalis; th., thalamus; th.p., pulvinar thalami; t.m., tegmentum mesencephali; t.p., temporal pole; v.iii., third ventricle.

"lenticulo-optic" artery, despite the fact that this vessel has no existence whatever and has been omitted from text-books of anatomy for many years. Moreover, the part played by the anterior chorioidal and posterior communicating arteries in the supply to the brain is practically ignored in modern medicine, while the basal supply from the anterior cerebral artery is even now only beginning to receive recognition.

Most of the following account has appeared in previous papers^{(7) (8) (9)} in a comparative survey of the cerebral arteries in the vertebrate series as a whole. It seems desirable to abstract the data referring to man, and to present it as an isolated study. For this purpose the whole subject was completely reinvestigated, providing an opportunity for checking the earlier results. These have been confirmed, and, as will appear, at least one new fact of importance has emerged.

Material and Methods.

Including the material of the former investigations, this description is based upon the examination of some twenty-four human hemispheres. In all cases the arteries were followed by actual dissection through the brain substance with the aid of a binocular microscope. Occasionally isolated vessels, in particular the anterior chorioidal artery, were injected prior to dissection.

The figures for this paper were all freshly drawn from the brains used for the present inquiry, and represent successive stages in dissection. In interpretation of the figures it should be borne in mind that in the interests of clarity they are slightly schematized, that the vessels which it is the purpose of any figure to emphasize are exaggerated in size, and that only vessels essential to that particular purpose are illustrated in any particular figure.

Description of the Arteries.

The Anterior Cerebral Artery (a.a.c.).

The anterior cerebral artery arises from the internal carotid artery and passes medially, dorsal to the optic nerve, to the medial border of the hemisphere (Figures I and II, A). With its further course we are not concerned. At the medial border of the hemisphere the anterior cerebral artery gives rise to a large branch which takes a recurrent course laterally over the anterior perforated substance. This branch gives off several twigs which enter the base of the brain, and it terminates by passing similarly into the brain substance (Figure II, A and B). Heubner⁽³⁾ was the first to describe this vessel, and it was named "Heubner's artery" by Aitken.⁽⁶⁾ It was rediscovered independently by Shellshear,⁽¹⁰⁾ who called it the "recurrent branch of the anterior cerebral artery". While the modern term, "medial striate arteries", is not strictly applicable to the branches of this vessel, the main trunk may readily be termed the "medial striate artery", since it was originally a vessel to the medial side of the olfactory tubercle and bulb.⁽⁹⁾ Throughout this paper, then, this artery is referred to as

the medial striate artery (a.m.s.). We are indebted especially to Macdonald Critchley⁽¹¹⁾ for a modern account of what is phylogenetically one of the oldest of the cerebral arteries.

When the branches of the medial striate artery are followed into the brain substance they are found to distribute themselves to the basal ganglionic mass over an area anterior to a line which approximately bisects the anterior perforated substance transversely (Figure II, C). Dissection from the lateral aspect (Figure III, A, B, C) reveals that these branches supply the lower anterior portion of the whole basal mass. In horizontal and coronal sections they are found to reach the lower part of the head of the caudate nucleus, the lower part of the frontal pole of the putamen, the frontal pole of the *globus pallidus*, and the anterior limb of the internal capsule up to the dorsal limit of the *globus pallidus* (Figures IV and V).

While this is the normal field of supply from the anterior cerebral artery, it is necessary to add that the medial striate artery exhibits occasional interchangeability with the lateral striate branches of the middle cerebral artery: sometimes the one, sometimes the other, predominates.

The Middle Cerebral Artery (a.m.c.).

The middle cerebral artery takes the greatest share in the supply to the basal ganglia and the internal capsule. It appears to be the continuation of the internal carotid artery after this has given off the anterior cerebral artery (Figures I and II, A). We are concerned here with its course only as far as the *limen insulae*, for within this distance it gives off the whole of its basal supply (Figure II, A and B). As the middle cerebral artery crosses the anterior perforated substance it gives rise to a large number of branches of different sizes which enter the brain just anterior to the attachment of the temporal lobe (Figure II, A, B, C). Traced into the cerebral substance, these twigs are found to pass laterally and caudally between the claustrum and the basal mass, into the latter of which they sink at various intervals. The largest of these was called the "lenticulo-striate" artery by Duret; but it will be observed that identification of any individual twig is impossible, and, as explained in the introduction, these vessels are referred to collectively as the lateral striate arteries (a.l.s.) in this paper.

When these twigs are followed into the basal mass it is found that some end in the lenticular nucleus, while the largest traverse this and the upper part of the internal capsule to end in the caudate nucleus (Figures III, A, B, and V). Thus the lateral striate arteries supply the whole of the putamen except the lower anterior pole, the upper part of the head and the whole of the body of the caudate nucleus, the lateral half or so of the *globus pallidus*, and the whole of the internal capsule—anterior limb, genu and posterior limb—above the level of the *globus pallidus* (Figures III, B, and V).

With regard to the basal branches of the middle cerebral artery two points are worthy of special emphasis.

In the first place it will be observed that directly after their entrance into the brain the lateral striate arteries are massed together between the putamen and the claustrum, that is, in the base of the external capsule (Figures II, C, and III, A). Thus for a short time a large number of arteries of different sizes is concentrated within a very small volume of cerebral substance. This fact provides the explanation for Charcot's observation that the anterior portion of the base of the external capsule is the "site of election" for cerebral hæmorrhage. Clearly this depends not upon any inherent malignancy of the vessels in this situation, but upon the law of probability—the number of arteries crowded within this small space is probably twice as great as that to be found in any other comparable volume of cerebral tissue. And this is ultimately dependent upon the fact that the rhinal fissure, through which the majority of the lateral striate arteries enter the brain, has become doubled upon itself during human phylogeny.⁽⁹⁾

In the second place I wish to draw attention to a vessel labelled a.d.op. in Figures III, B, and V, D. This is an artery of medium size, which arises with the lateral striate vessels and passes caudally, partly through the substance of the putamen, to reach the fibres from the infralenticular and retrolenticular parts of the internal capsule, thus supplying the auditory and optic radiations immediately after they leave the capsule. Beevor⁽⁵⁾ established the fact that this region is supplied by the middle cerebral artery (Figure IV), and Madame Schiff-Wertheimer⁽¹²⁾ postulated that the supply is from the basal branches of this vessel; but this is the first occasion, I believe, upon which the existence of the supply has been established by actual dissection of the artery involved. Since the artery appears to be of clinical importance, it seems desirable to apply to it a distinctive title. Consequently I have named it the "deep optic branch" of the middle cerebral artery—"deep" because some cortical twigs from the middle cerebral artery supply the periphery of the *area striata* (visual cortex).

The Posterior Communicating Artery (a.p.co.).

Immediately beyond its origin from the internal carotid artery the posterior communicating artery gives off some large twigs which enter the base of the brain between the infundibulum and the optic tract (Figures II, A, B, and V, B). Above the tract these vessels pass somewhat laterally and then sink into the internal capsule, in which they ascend as far as the dorsal limit of the *globus pallidus* (Figures II, D, III, C, and V, B). They supply the whole of the genu and more or less of the anterior one-third of the posterior limb of the internal capsule (Figures III, C, and IV). The posterior communicating artery supplies also approximately

the anterior one-third of the thalamus (excluding the anterior nucleus).

Kolisko⁽⁴⁾ first determined the distribution of the posterior communicating artery to the internal capsule, and Beevor⁽⁵⁾ confirmed his findings. As explained below, this artery betrays a fair amount of interchangeability with the anterior chorioidal artery.

The Anterior Chorioidal Artery (a.ch.a.).

The anterior chorioidal artery, probably the least known of any discussed here, is, next to the middle cerebral artery, the most important source of supply to the internal capsule. Its first recognition came from Heubner,⁽³⁾ and it has received extensive investigation by Kolisko,⁽⁴⁾ Beevor,⁽⁵⁾ Schiff-Wertheimer,⁽¹²⁾ Ley⁽¹³⁾ and Poppi.⁽¹⁴⁾⁽¹⁵⁾ Its morphology and complete distribution are discussed elsewhere;⁽⁷⁾⁽⁸⁾ here we are concerned only with its basal supply.

This vessel arises from the internal carotid artery, just beyond the origin of the posterior communicating artery, and it passes caudally on the optic tract, around the *crus cerebri*, as far as the lateral geniculate body (Figures I and II, A and B). Here its largest branches turn fairly abruptly laterally to enter the chorioidal plexus in the inferior horn of the lateral ventricle. During its passage caudally the anterior chorioidal artery gives rise to several branches which either pierce the optic tract or pass medial or lateral to it (Figure II, A and B). Some of those passing medial to the tract enter the middle one-third (pyramidal portion) of the *crus cerebri*; but the largest, as well as those passing through and lateral to the tract, turn laterally and enter the base of the brain (Figure II, C). Towards its termination the anterior chorioidal artery gives rise to some twigs which supply the lateral geniculate body and the tail of the caudate nucleus, and some which pass above the tail and over the roof of the inferior horn of the lateral ventricle (Figure II, C and D).

Followed into the brain substance, most of the twigs are found to end in the posterior limb of the internal capsule, of which they supply rather more than the posterior two-thirds, reaching to the dorsal limit of the *globus pallidus* (Figures II, D, and V, C). The twigs which pass in the roof of the inferior horn of the lateral ventricle supply the whole of the infralenticular and retrolenticular portions of the capsule as well. A few twigs from the anterior chorioidal artery reach the lateral aspect of the ventral nucleus of the thalamus, while others supply the postero-medial portion of the *globus pallidus* (Figures IV and V, C).

The origin of the anterior chorioidal artery occasionally betrays some variation: some of its branches, or rarely the whole vessel, may arise from the middle cerebral artery. In Figure II, A, B, C, D, the branch marked "X", which normally springs from the anterior chorioidal artery, was found to arise from the middle cerebral artery. In these figures, however, it is regarded as a branch of the

anterior chorioidal artery. It would appear that Duret's identification of a "lenticulo-optic" artery depended upon one of the rare cases of origin of the anterior chorioidal artery from the middle cerebral, or else he did not take sufficient care to exclude the anterior chorioidal artery when injecting the middle cerebral. At least, the vessel which he called the "lenticulo-optic" artery had almost precisely the same field of supply as has the anterior chorioidal artery.

Other abnormalities of the anterior chorioidal artery depend upon variations in size. It may be very small (rarely entirely absent), and then the posterior communicating artery is enlarged to repair the deficiency; or it may be very large (even to forming the stem of the posterior cerebral artery) and replace almost entirely the resulting minute posterior communicating artery.

To complete the survey of the blood supply to structures surrounding the internal capsule it is necessary to add a few details. The remainder of the tail of the caudate nucleus is supplied by the posterior cerebral artery. Of the thalamus, the posterior cerebral artery supplies the anterior nucleus, and the anterior chorioidal artery the lateral part of the ventral nucleus; the posterior communicating artery supplies the anterior one-third, the posterior cerebral artery the posterior two-thirds, of the remainder.

Summary.

The Supply to the Internal Capsule.

1. Above the level of the *globus pallidus* the whole of the internal capsule is supplied by the lateral striate branches of the middle cerebral artery.

2. Up to the level of the dorsal limit of the *globus pallidus* three arteries are involved:

(a) The medial striate branch of the anterior cerebral artery supplies the anterior limb containing the frontal thalamic radiation and the premotor pathway.

(b) The posterior communicating artery supplies the genu and a little of the posterior limb, containing pyramidal fibres to the head.

(c) The anterior chorioidal artery supplies most of the posterior limb, containing the remaining pyramidal fibres and the ascending fibres of general sensation to the parietal lobe; it supplies, in addition, the whole of the infralenticular and retro-lenticular parts of the internal capsule, containing the auditory and optic radiations.

The Supply to Structures Surrounding the Internal Capsule.

1. *The Caudate Nucleus.*—The medial striate branch of the anterior cerebral artery supplies the ventral part of the head of the caudate nucleus; the lateral striate branches of the middle cerebral artery supply the remainder of the head and the whole of the body; the posterior cerebral and anterior chorioidal arteries supply the tail.

2. *The Putamen.*—The medial striate branch of the anterior cerebral artery supplies the ventral

portion of the head of the putamen; the lateral striate branches of the middle cerebral artery supply the remainder.

3. *The Globus Pallidus.*—The medial striate branch of the anterior cerebral artery supplies the frontal pole of the *globus pallidus*; the lateral striate branches of the middle cerebral artery supply the lateral portion, the anterior chorioidal artery the medial portion, of the remainder.

4. *The Thalamus.*—The posterior cerebral artery supplies the anterior nucleus and the anterior chorioidal artery the lateral part of the ventral nucleus; the posterior communicating artery supplies the anterior one-third, the posterior cerebral artery the posterior two-thirds, of the remainder of the thalamus.

5. There is some degree of interchangeability between the fields of supply of the medial and lateral striate arteries and between those of the posterior communicating and anterior chorioidal arteries.

General.

1. The "lenticulo-optic" artery of Duret does not exist.

2. The term "lenticulo-striate" as applied to one of the basal branches of the middle cerebral artery is open to several objections and is replaced by the collective title "lateral striate arteries", to include all these vessels.

3. The terms "Heubner's artery" and "recurrent branch of the anterior cerebral artery" as applied to the large basal branch of the anterior cerebral artery are discarded in favour of the title "medial striate artery".

4. Special emphasis is laid upon the fact that all the basal branches of the middle cerebral artery have become crowded into a small space at the base of the external capsule in the human brain; this is the anatomical basis for the clinical observation that this situation is the commonest site of origin for cerebral hæmorrhage.

5. A hitherto undescribed artery of apparent clinical importance, which arises with the basal branches of the middle cerebral artery and supplies the auditory and optic radiations after they leave the internal capsule, is described. This vessel has been called the "deep optic branch" of the middle cerebral artery.

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A NOTE ON THE USE OF ADRENALINE IN VAGINAL PLASTIC OPERATIONS.

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AND

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It has been the custom of one of us (R.I.F.) for eighteen years to inject into the superficial tissues a weak solution of adrenaline when doing vaginal plastic operations, and it has been suggested that the method of its administration should be communicated.

Objects.

The purposes of the method are: (i) the elimination of the continuous drip method; (ii) the maintenance of a clear field, which favours greater accuracy of dissecting and suturing; (iii) diminution of blood loss.

The original method of the continuous drip allowed a large volume of saline solution to flow over the operation field, carrying away an unknown and often large quantity of blood from the dissected tissues.

Technique.

Adrenaline hydrochloride in a dilution of 1 in 350,000 in normal saline solution is prepared and injected into the submucous tissues of the operation area. A syringe of ten or twenty cubic centimetres capacity, with finger rings and bayonet-fitting needle, is used.

In operations on the cervix the solution is also injected into the cervical tissue that is to be removed. Any serum syringe can be used; but in operations on tough fibrous cervixes a finger-ring syringe has great and obvious advantages. This controls the general oozing; but occasionally a major vessel must be controlled by ligature. This,

however, is seldom necessary. The best effects are obtained on the cervix and anterior vaginal wall. Bleeding from the large vessels in the recto-vaginal wall is seldom controlled by adrenaline.

It is also found that the solution spreads in a natural plane of cleavage, and dissection is greatly facilitated.

For a cystocele of average size about ten cubic centimetres of solution are required, and a similar amount for an average cervical repair.

It has been suggested that reactionary hæmorrhage and delayed union or malunion of the tissues might follow the use of such a method. We have watched carefully and have never experienced the former, and we have been unable to observe any change in the uniting powers of the tissues in several hundreds of cases, both in public and private hospital work. Also it is our impression that our share of secondary hæmorrhages has been no more than that experienced by most gynaecological surgeons.

Reports of Cases.

A CASE OF POST-VACCINAL MYELITIS.

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AND

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THE apparently infrequent occurrence of symptoms referable to the central nervous system following vaccination prompts us to report the details of a case of post-vaccinal myelitis.

In July, 1936, five hundred native Nauruans were vaccinated. They were mostly between the ages of three and fourteen years, males and females being almost equal in numbers. In fourteen patients local pain developed in the vaccinated arm, with axillary adenitis and a rise in temperature to about 37.8° C. (100° F.). The symptoms in these cases soon subsided.

A girl aged nine years was vaccinated on July 17. She "took" well, and there was nothing abnormal about the site of vaccination. On July 24, at 9 p.m., the child was brought to hospital with the following history. Two days previously she had had "fever", with slight pain at the back of the neck; there had been no vomiting. The fever had continued during the following day, but was less marked, and the pain in the neck had disappeared. On both days she was constipated. On July 24 she had complained of pain in both legs, followed some hours later by aching pains all over the body. The mother then noticed that the lower part of the abdomen was swollen. There had been little abdominal pain, except when the child was passing urine, when she complained of lower abdominal pain. On this day she had had some frequency of micturition. There had been no vomiting, and the bowels had not been opened.

On admission to hospital the child had practically no pain discoverable anywhere. She stated that her legs felt slightly weaker than normal. The lower part of the abdomen was definitely swollen, and it was as rigid as a board. A catheter was passed and forty-eight ounces of urine were withdrawn; urinalysis revealed no abnormality.

Subsequent examination of the abdomen revealed nothing suspicious. The chest was clear and the throat was normal. There appeared to be some weakness of the lower limbs, but the reflexes were approximately normal. The abdominal reflexes were absent. The temperature was 37.8° C. (100° F.), the pulse rate was 66, and respirations were 24.

The child slept well from midnight onward, and on the morning of July 25 complained of further pain in the back of the neck and in the upper part of the back. She was now unable to move her legs and had not passed urine since catheterization on the previous night. On examination at 8.30 a.m. the child's neck was seen to be very stiff, and it could not be flexed without considerable pain at the back. The lower limbs were paralysed and the muscles were flaccid. The knee jerks were present but diminished, and the plantar reflex was absent. The abdominal reflexes were still absent. At 10 a.m. the temperature was 38.7° C. (101.6° F.), the pulse rate was 96 and the respirations were 24.

At 11 a.m. the knee jerks had disappeared. There was some weakness of the upper limbs and complete sensory loss to the level of the sixth thoracic segment on both sides. The child was conscious, but very lethargic. Lumbar puncture was performed under light chloroform anaesthesia, and five cubic centimetres of clear fluid not under pressure were withdrawn. The fluid contained five cells (lymphocytes) per cubic millimetre. The test for globulin gave no reaction. Staining of a slide revealed no organisms, and no growth resulted after a seventeen hours' attempted culture on blood agar. A tentative diagnosis of meningo-myelitis following vaccination was made.

At 4 p.m. the temperature was 39.1° C. (102.4° F.), the pulse rate was 82, and the respirations were 26. As the child had not passed urine, she was again catheterized and thirty-two ounces of urine were withdrawn. The patient vomited twice during this afternoon.

On July 26 the child felt slightly better and she appeared to be a little brighter. The pain in the neck was less and the stiffness was not so marked. There had been no advance in the paralysis of the upper limbs, and the child had passed urine naturally twice during the night.

On July 27 the upper limit of anaesthesia had receded so that a pin prick could be felt all over the abdomen, except for a small area in the right iliac fossa. The legs were still paralysed and the knee jerks were absent.

Slow improvement took place in the perception of sensory stimuli in the lower limbs, and on August 9 movement of the great toe on each side was noted. After this, improvement was rapid, with daily increase in movement and power. The child was discharged on October 2, 1936. The findings in December, 1936, were normal, except for a slight exaggeration of the knee jerks.

Comments.

In "The Medical Annual" for 1933 three cases of post-vaccinal myelitis are reported, with onset twelve, thirteen and fourteen days respectively after vaccination. These are longer incubation periods than was that in our case. However, in the same article it is noted that cases of encephalitis have occurred from five to thirty-three days after vaccination. The average incubation period is given as from ten to thirteen days.

The vaccine lymph used was prepared by the Commonwealth Serum Laboratories. No note was made of the batch used, but it is very unlikely that the particular batch had any special effect in this one case, as over ninety other persons were vaccinated with lymph from the same phial without any noteworthy sequelae.

The child was vaccinated by the cross-scarification method; this method seemed to produce no more ill-effects than the method of using one scratch only. Approximately half the persons vaccinated were done by one of these methods, and the other half by the other.

The diagnosis was made because of the similarity to the cases quoted in "The Medical Annual", the absence of evidence of infection of the cerebro-spinal fluid, and the antecedent vaccination. The Wassermann test was not performed owing to lack of facilities, but clinical records

do not indicate the presence of syphilis, and we have not met with any cases suggesting syphilis in the last two years, so that this disease as a cause seems to be extremely unlikely. The almost parallel advance of paralysis and anaesthesia indicated some form of ascending myelitis; and the absence of permanent involvement appears to correspond with the findings in those cases occurring after vaccination in which the patients recover.

A CASE OF DERMATOMYOSITIS.

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DERMATOMYOSITIS, a somewhat rare malady, is characterized by some swelling of the face, hyperaesthesia of muscles, and a strange heliotrope or mauve hue of the face and other parts of the body.

C.M., a boy, aged nine years, was sent to hospital by Dr. Armstrong, of Uralla, New England, with the diagnosis of dermatomyositis.

He was a big broad boy for his age, and intelligent. He could sit up for short periods, but "crumpled up" when put on his feet. He stated that his muscles were too weak and too painful to bear his weight. He gave a history of measles four months before admission; he had not been well since. For six weeks he had had pains in his back and the calves of his legs, and later in his arms. There was swelling of his face, arms and legs. He simply could not bear any pressure over these areas. His mother stated that his face, hands and legs had been a strange purple colour.

On examination the face appeared to be swollen, with a pale heliotrope coloration of the cheeks and round the eyes. Any pressure on the face caused pain. Asthenia of the musculature was marked. He could not walk and was able to sit up only with difficulty.

Tenderness of the abdominal muscles and of the muscles of both legs and arms was a conspicuous feature.

Examination of the heart and lungs revealed no departure from normal. The knee jerks were feeble. The spleen was not palpable.

The tonsils were obviously diseased and yielded a profuse growth of haemolytic streptococcus. They were enucleated ten days after admission, and steady improvement in symptoms and signs followed until his discharge six weeks later. The temperature rose to 37.4° C. (99.4° F.) occasionally before the operation, and to 37.8° C. (100° F.) occasionally in the early days after this event.

The blood examination showed no evidence of anaemia or of punctate basophilia.

The white blood cells totalled 5,000 per cubic millimetre, 48% being polymorphonuclear cells, 25% lymphocytes, 20% mononuclear cells, and 7% eosinophile cells. Coagulation time and bleeding time were normal. The serum calcium content and serum phosphorus content were estimated at 10.6 and 5.6 milligrammes per 100 cubic centimetres respectively.

X ray examination revealed a large dolicocephalic type of skull. The pituitary fossa appeared normal.

As regards his subsequent progress, Dr. Armstrong sent me the following report six months after his return home.

In response to your inquiry of C.M., I have had him in and examined him. His general condition is good. There has been slight loss of weight, there is no tenderness present in any of his joints. He has the same high colour in the face, a bluish pink blush. There are patches of a small rash, dark pink in colour, over the extensor aspect of every joint. It gives the hands quite a peculiar effect. It is present over the joints of the toes as well. It is non-irritable. There is no oedema present. His mother reports that he

has plenty of energy, but it is soon used up, and he has to come in and rest after short intervals of play. At these times he complains of a stiffness of his muscles and his joints, which, in his own words, "catch". She also states that the swelling is sometimes present in his face in the mornings.

He is quite bright mentally and has commenced school again.

Comment.

The first description of this disease was by Wagner in 1877, at Leipzig.

Hepp, of Strasburg, collected a series of 28 cases, in 17 of which death occurred. Cases are classified as acute, subacute and chronic. The ages of the patients vary from childhood to over fifty years. As regards causation, the weight of evidence favours bacterial invasion. The heliotrope coloration of the skin in various areas, the weakness and hyperaesthesia of the muscles, contractures at the elbow joint, and numbness and tingling of the fingers have been noted in various cases.

In 1935, Edward S. Stuckey (*The British Journal of Dermatology and Syphilis*, March, 1935) reported a case that occurred at the Royal Prince Alfred Hospital, with a commentary and a summary of the literature on this subject. This case ended fatally two years after the first symptom was noted. The patient was twenty-five years of age and had a most extensive rash.

Reviews.

GREEK MEDICINE.

"GREEK MEDICINE" is the latest volume of the well-known series of *Clio Medica* primers issued by Paul B. Hoeber, of New York, and published under the editorship of Professor E. B. Krumbhaar, of the University of Philadelphia.¹ The author, Dr. Fred B. Lund, of Boston, has brought to bear on the work a wealth of knowledge of the subject derived from a close and critical study of the works of most of the ancient Greek medical writers, and from the originals of those writings when they have been obtainable. Fresh from their perusal, he has, wherever it has been possible, employed the exact words and phraseology of these ancient masters of our art with the laudable object of affording readers the opportunity of following the workings of the minds of the masters so far as their actual expressions allow this to be done.

The plan of the book is commendable in that it deals with the personal side of the Greek story of medicine, so that the reader comes to invest each of the names as they are mentioned with life and movement. It may be possible to practise medicine in these days without any knowledge of those healers of the past who blazed the trail; but it is utterly impossible for anyone trained in medicine to delve, however cursorily, into the beginnings of our art without feeling much better fitted for practice. In medicine, as practised and expounded by the ancient Greeks, we distinguish the very foundations of the healing art, and in this small pocket volume of 154 pages Dr. Lund has traced for us the rise and progress of rational thought as applied to our profession from the time when Hippocrates flourished, some five hundred years before Christ, until that day, in the thirteenth century after Christ, when the last of the great Byzantine writers, Johannes Actuarius, located the cause of tetanus in the spinal cord, showed his familiarity with lead poisoning, and described the whip-worm.

¹ *Clio Medica: A Series of Primers on the History of Medicine*, edited by E. B. Krumbhaar, M.D. XVIII, Greek Medicine, by F. B. Lund, M.D.; 1935. New York: Paul B. Hoeber. Crown 8vo, pp. 171, with illustrations. Price: \$2.00 net.

A MANUAL OF TREATMENT.

THE minor medical manuals are manifold. There are the classics, ruminated by successive generations and reedited by successors of the original authors, and there are the others which apparently go "where all the pins go to". "Vade Mecum of Medical Treatment", though not to be placed among the "classics" perhaps, deserves a large measure of popularity.¹

Though not intended to be a "pocket-book", it is of convenient size and could be carried in the bag or in one of the receptacles in a motor car by those who take the title literally and distrust their wit or knowledge in a possible emergency. There is a large amount of information in its 360 pages, and it is fully abreast of the times. Though the subjects are alphabetically arranged, except for the grouping together of diseases of one organ, an index has been provided. In addition to the brief tables given in the text, under, say, diabetes and nephritis, there are numerous tables at the end of the book, such as a comprehensive table (for diagnostic purposes) of the characteristics of the cerebro-spinal fluid, tables for the glucose tolerance test, lavulose tolerance test, urea concentration test, normal figures for constituents of the blood, vitamin contents of foods, time of digestion of foods, calorie values, weights and measurements of human organs, equivalent weights, measurements and temperatures, a posological table and a table of doses proportionate to age, and some others. On the edge of the front cover board there is a scale of inches, and on the edge of the back cover board a metric scale. Bound in leather-cloth, it is a book easy to hold, and the print is very clear and pleasing. It is very pleasantly written and would be very profitable reading "between patients", and might ultimately prove of greater value than some expensive books, which too often merely ornament the book-shelves.

A MANUAL FOR DIABETIC PATIENTS.

MISS MADELEINE SCOTT, the sister-in-charge of the diabetic clinic at the Royal Prince Alfred Hospital, Sydney, has written a small manual with the title "So I'm a Diabetic?"²

The little book is intended for the guidance of diabetic patients, and it admirably fulfils that purpose. Nothing better of the kind has appeared in recent years. Miss Scott's volume is the fruit of her very large experience in the handling of large numbers of patients at the hospital clinic. The work is arranged in the form of questions and answers, and contains all that a diabetic needs to know in order to avoid the pitfalls of home treatment and to keep himself in first-class condition. A noteworthy feature is the cheery optimism evident in all that Miss Scott has written. There are numerous illustrations, both photographic and diagrammatic, showing the method of using an insulin syringe, the sites for insulin injections, the proper manner of nail cutting, the use of a letter scale for measuring food, *et cetera*. Cooking recipes, tables of food values, and urine testing charts are also included. We cordially recommend the book to those whom it is intended to help. There is a short preface by Dr. Kempson Maddox.

If we may venture to suggest an alteration, it is that the parody (facing page 64) of Rudyard Kipling's edifying poem "If" should be excluded from future editions. It is "an unlick'd bear-whelp that carries no impression like the dam".

¹ "Vade Mecum of Medical Treatment", by W. G. Sears, M.D., M.R.C.P.; 1937. London: Edward Arnold and Company. Crown 8vo, pp. 373. Price: 10s. 6d. net.

² "So I'm a Diabetic", by Madeleine Scott, A.T.N.A., with a foreword by K. Maddox, M.D., M.R.C.P.; 1937. Australia: Angus and Robertson Limited. Crown 8vo, pp. 67, with illustrations. Price: 3s. 6d. net.

The Medical Journal of Australia

SATURDAY, OCTOBER 2, 1937.

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FREEDOM AND RESPONSIBILITY.

PEOPLE with imagination generally condemn those who interlard their speech with platitudes. And who can blame them? The imaginative mind naturally revolts at repetition of the obvious, but at the same time a trite saying often slips so glibly from the tongue that its meaning is not considered and its final implications are not sought. To say that the freedom enjoyed by professional men carried with it certain social responsibilities would be almost a platitude, yet it is a theme that professional men might well consider. This theme was pursued at the annual meeting of the American Medical Association last June by Dr. Charles Gordon Heyd, the retiring President.¹ He began with the statement that from remote times the doctor had enjoyed complete professional freedom and had thereby assumed great social responsi-

bility. Readers will remember that at the last meeting of the Federal Council of the British Medical Association in Australia the dominant note was service to the community. The same note was struck by the retiring President of the American Medical Association. Many persons are prone to look upon the United States of America as a country where health organization is complete and where medical science is liberally endowed. But it appears that there are certain parts of the United States "where it is impossible under present conditions to provide any fair degree of medical service". These "backward areas" need to be "elevated culturally, physically and intellectually by more education, by proper housing, by adequate nourishment, by better protection against climatic and endemic disease". In some parts of the country less than ten cents per person is spent every year on public health, as compared with two dollars eighty-five cents in the more advanced States. Of course, the spending of money on health organization is useless if the earning capacity of the people is such that they cannot provide themselves with an adequate and properly balanced diet, or if, having the necessary means, they are so lacking in education that they do not know how to spend their money to the best advantage. Dr. Heyd deplores the fact that it is impossible to make people of average intelligence look after themselves. He states, for example, that there is more delayed medical attention among employees and non-professional staffs of hospitals than there is outside the hospital field. The social responsibilities of medical practitioners in America are enormous; they are probably no less in Australia.

Dr. Heyd makes a very good point when he shows that discoveries made by practising medical men throughout the centuries have changed the whole current of life. It is quite unnecessary to attempt an enumeration of these discoveries, but it should be emphasized that they have been made without expectation of any personal advantage or the receipt of any monetary reward. Life is being prolonged, and in the future degenerative conditions of old age will bulk more and more largely in the diseases

¹ The Journal of the American Medical Association, June 12, 1937.

which the medical practitioner is called upon to treat. Dr. Heyd estimates that by the year 1960 the population of the United States may have become stationary; one out of every five of the population will be over sixty years of age, and heart disease, cancer, nephritis, pneumonia, accidents and apoplexy will be the chief causes of death. If this happens in the United States, it will happen in other civilized countries. We may presume that it is to the advantage of mankind that people should live longer. Man owes his long life to medicine and to the work of medical scientists. The people as a whole, that is the governments and those who have amassed great wealth from others, should therefore see that no one with the ability and the desire to undertake medical research is hampered through lack of money.

Possibly on account of the discoveries of medical science and from the very nature of the medical calling medical practitioners have enjoyed what Dr. Heyd calls professional freedom—the doctor has lived and maintained himself in spite of war, catastrophes and revolution. As the public at large owes something to the doctor, so does the doctor owe something to the community. In several parts of the Commonwealth medical practitioners are at present concerned with the provision of a medical service to the community. This ideal will, the public may rest assured, be pursued with diligence and determination. Medical practitioners should also consider whether they are taking their full share in the public life of the State, and whether, individually and collectively, they could not make fuller use of their special knowledge for the betterment of the conditions of life.

Current Comment.

THE PERILS OF SULPHANILAMIDE.

PARA-AMINOBENZENESULPHONAMIDE, known as sulphanilamide or "Prontosil", with an allied preparation, "Proseptasine", has already gained a very favourable verdict in the treatment of hæmo-

lytic streptococcal infections and, to a lesser extent, those due to other organisms. Untoward manifestations have occasionally occurred, such as sulphæmoglobinæmia, with alarming cyanosis. This complication is more prone to arise when sulphur or sulphate of magnesium or of sodium is taken at the same time as the sulphanilamide. Gastric disturbances have also been noted during the administration of the preparation. On the whole, toxic manifestations have not been obtrusive. Anæmic patients, however, require great caution in its administration, and nephritis should be specially considered. This period of therapeutic complacency has been rudely disturbed by A. M. Harvey and C. A. Janeway.¹ They mention the fact that minor toxic effects of the drug have been observed, such as a depression of the liver function, pyrexia, cyanosis and mild acidosis. They state, however, that a drug so closely related to aniline might exert a very serious effect on the blood and bone marrow, and, within a few weeks, three cases of severe hæmolytic anæmia were observed by them in the hospital wards where no previous cases were known. The patients were all treated by sulphanilamide—two for streptococcal sore throat and one for meningococcal meningitis. Harvey and Janeway could not prove conclusively that the drug caused the rapid hæmolysis, but they considered that it was responsible for the hæmolytic crises. They also ascertained that a further case of hæmolytic anæmia had occurred in the city (Baltimore) during the exhibition of the drug, and since the report was submitted two additional cases of hæmolytic anæmia in patients undergoing sulphanilamide treatment were observed. Other conditions that might have produced an acute anæmia of this type were excluded. The patients were not suffering from hæmolytic jaundice, sickle-cell anæmia or paroxysmal hæmoglobinuria. The clinical picture closely resembled that of Lederer's anæmia. When the patients were well enough for discharge from hospital an endeavour was made to reproduce the picture in mild form by administering a small dose of the drug. No significant changes were seen in the blood, and the patients had no symptoms, except one who had slight nausea. Skin tests also gave no reactions. Harvey and Janeway state that sulphanilamide had often been given to patients in similar dosage without any effect on the blood picture. Two of the patients suffering from hæmolytic anæmia were subsequently given a small dose without any reappearance of the curious blood picture. These facts led Harvey and Janeway to believe that this was not a matter of toxicity from overdosage or of the type of drug idiosyncrasy that sometimes occurs after amidopyrine. There was a striking resemblance between these hæmolytic anæmias and the hæmolytic crises produced by phenylhydrazine. Possibly these individuals produce from the drug a small quantity of a toxic substance

¹ *The Journal of the American Medical Association*, July 3, 1937.

with an action like phenylhydrazine, or they elaborate such a substance more rapidly than an average person. Whatever may be the final explanation, it is imperative to watch the blood picture carefully and to give special attention to evidences of red blood cell destruction and regeneration, such as reticulocytosis, the presence of nucleated red cells and the occurrence of bile and urobilin in the urine, faeces or blood. In the affected patients transfusions of citrated blood were followed by disappearance of symptoms and prompt lessening of the anaemia.

Further cause for disquietude has been furnished by C. J. Young.¹ He records a case of fatal agranulocytic angina. In this case the bone marrow exhibited complete myeloid aplasia. The only benzene ring drug administered within twenty-four days of the development of agranulocytosis was sulphanilamide. The conclusion arrived at was that if the agranulocytosis was not of the idiopathic type and of unknown aetiology, it was caused by the sulphanilamide. The patient had received "Prontosil album" for a rheumatic attack associated with *Staphylococcus aureus* and *Streptococcus viridans*. It now becomes obvious that the administration of sulphanilamide must be conducted with the greatest caution.

IODINE POISONING.

TINCTURE OF IODINE is so extensively used for external application that it must be regarded as being of a very low order of toxicity. In the majority of households it is used as an antiseptic in those first-aid measures that are so often applied to minor injuries, and it is possible that part of its appeal lies in the obvious staining of the skin. Therefore there must really be very few persons in the community who are sensitive to iodine applied locally, and, indeed, iodides have been so widely used in internal medicine that even the well-known symptoms of iodism must indeed be rare. W. B. Seymour reports a fatal case of iodine poisoning due to local application to the skin.² He points out that there are five ways in which toxic symptoms may arise: by ingestion of iodine or its alcoholic solution, by ingestion of iodides, by inhalation of the fumes of iodine, by absorption of the tincture from a cyst into which it has been introduced as a sclerosing agent, and by the absorption of an alcoholic solution applied to the skin. It is curious that this last route should afford the opportunity for sufficient absorption to cause systemic effects, but this undoubtedly is possible, as the literature shows. Cases of suicidal or accidental poisoning caused by swallowing the tincture need no special mention, nor do the familiar

features of iodism, but it may be remarked that Seymour quotes Nothnagel and Rossbach as having collected from the literature thirty-five fatal cases due to the absorption of iodine from cysts. The case he records in the present instance is that of a man, aged fifty-two years, who was found to be suffering from pulmonary tuberculosis, and who was treated by artificial pneumothorax. Iodine in the form of the United States Pharmacopœia tincture was applied to the skin as a disinfecting agent, the routine employed being to paint an area ten to twenty centimetres in diameter with this tincture and then to remove most of the iodine with plain spirit. The United States Pharmacopœia tincture of iodine contains 7.5% of free iodine, and is actually weaker than that of some other pharmacopœias. It was noticed that after each treatment the patient felt worse and the temperature rose, but on the sixth occasion some reddening of the skin at the site of operation was observed, followed on the next day by a morbilliform eruption all over the body. Some days later another refill of air was given, alcohol only being used to prepare the skin, but on the next occasion iodine was again used. That night the temperature rose steeply, a morbilliform rash appeared, which next day became confluent and, in the few succeeding days before the patient's death, exfoliative in type. The mucosæ were also acutely inflamed, fever persisted, the man's condition became rapidly worse, with exacerbation of the pulmonary disease, and disorientation and coma ushered in the fatal termination. A full autopsy was performed, the pathological diagnosis being exfoliative dermatitis and inflammation of the upper portions of the respiratory tracts, bilateral ulcerative and proliferative pulmonary tuberculosis and tuberculous ulcer of the cæcum.

Seymour summarizes from the literature thirteen other cases in which hypersensitivity to cutaneous application of alcoholic solutions of iodine was recorded. Some of the patients described showed only comparatively mild reactions of the urticarial or erythematous type, but severe cutaneous and systemic reactions occurred, and six of these patients died. The interesting point is raised in this case as to whether there is a particular susceptibility of tuberculous patients to iodine, for it is generally believed that iodides should not be administered to those suffering from pulmonary tuberculosis. Lass has shown that the subjects of tuberculous disease of the lungs are more sensitive to intradermal injection of sodium iodide than normal persons. Whether this was a factor in the case just described is doubtful, but the moral is that there is no medicinal preparation, however simple, to which some persons may not be peculiarly susceptible. A substance like iodine in solution is known to be irritant by nature, and if when it was being used symptoms of local disturbance arose, it would be wise to substitute some other equally effective chemical.

¹ The British Medical Journal, July 17, 1937.

² Archives of Internal Medicine, June, 1937.

Abstracts from Current Medical Literature.

RADIOLOGY.

Intervertebral Disk Changes.

A. CRAIG MOONEY (*British Journal of Radiology*, May, 1937) discusses the radiological examination of the intervertebral disks. He states that Scheuermann was the first to call attention to a very circumscribed picture of disease, occurring from the fourteenth to the seventeenth years, in the lower dorsal spine of adolescents, and presenting the appearance of a dorsal kyphosis. The radiological changes appear as a blurring of the ossific nuclei of the plates, with irregular densities and deformities of the vertebral disk borders, more particularly anteriorly, where compression forces are greatest. The vertebral bodies show a bony rarefaction on the diaphyseal aspect of the cartilage plates, with collapse and wedging, which may be so gross that the appearances of caries are presented, but as the condition advances sclerotic lines of limitation are laid down. The condition is not associated with any great degree of pain, and is unfortunately often well established before the deformity brings the patient for examination. Nevertheless, if treatment is not too long delayed, regeneration takes place, wedging diminishes and the deformity may be in great part corrected and the disk left intact. The radiological, aetiological and clinical pictures are entirely those of osteochondritis, which apparently involves both epiphysis and vertebral body. Schmorl, however, maintains that the first and causative factor in these cases is a breakdown of the central zone of the cartilage plate, the ensuing nuclear escape being responsible for the destructive vertebral changes that follow. The sequence is: central cartilage lesion, nuclear escape, vertebral collapse and wedging (the latter bringing the epiphyseal ossific nuclei to atrophy). His suggestion finds support in the findings in adolescent spines of nuclear expansions and nuclear protrusions. There is no doubt that the appearances described by Scheuermann and these central affections of the cartilage plate are lesions of a similar nature, in so far as traumatic stresses play a causative part. Many patients with lower dorsal kyphosis do present the appearances of nuclear escape with nodal prolapses, collapse and wedging, and show the sequence of changes described by Schmorl. The evidence points to the existence of two separate types of kyphosis, the pictures being somewhat similar; in that of Scheuermann, however, there is a true osteochondritis of epiphyseal origin. In any case, the fact remains that in all such conditions the potentiality for disability

should be recognized. Patients exhibiting nuclear expansions might be protected from severe exercise or faulty postural occupations or habits. Grosser nodal changes would require more particular care, for even when healed the disk is left with the disadvantage of loss of nuclear turgor, and the orthopaedist is able to control posture and spinal movements until such time as the disk and the still-growing vertebral body have adapted themselves to the altered circumstances. The neglect of these conditions may result in the premature onset in middle life of disabling spinal deformities. Although radiological observation has not been established sufficiently long to correlate the spinal deformities of later years with adolescent lesions, adult spines are not infrequently seen with marked degenerative changes in the lower dorsal region, the remainder of the spine presenting the normal age appearances. There is no doubt that these changes are the sequelae of adolescent lesions.

Röntgenological Findings Following Head Injuries.

J. TOWNSEND TRAVERS (*Radiology*, June, 1937) states that symmetrical filling of the ventricles and subarachnoid spaces, or dilatation of one or both ventricles without a ventricular shift, definitely excludes a subdural haematoma. It should be noted also that in subdural haematoma the ventricular shift is away from the side of the lesion, while in the presence of scar tissue resulting from a laceration of the brain there may be a ventricular shift toward the lesion. As the clinical symptoms of subdural haematoma may simulate those of other post-traumatic sequelae, the differential diagnosis is of importance, for surgical treatment is definitely indicated in subdural haematoma. The earlier the operative interference, the better the results. In other cases with similar clinical symptoms surgery may be definitely contraindicated. The encephalogram is also of value in the localization of a subdural haematoma, for the localizing signs and symptoms are often confusing.

The "Phrygian Cap" Deformity of the Gall-Bladder.

W. H. MEYER, R. F. CARTER AND L. H. MEEKER (*American Journal of Roentgenology*, June, 1937) state that the clinical significance of the "Phrygian cap" is difficult to establish from a study of operative specimens alone. In the authors' experience there have been many patients in whom the anomaly could be seen in the Röntgenogram, and there were no physical signs of gall-bladder dysfunction or bile stasis after the patient had been completely examined. At the present time the Röntgen findings of a septum division in the fundus of the gall-bladder is not thought to be suf-

ficient to justify a diagnosis of disease of the organ unless it is accompanied by distinct evidence of bile stasis or cholelithiasis. The presence of the septum plays no part in the selection of patients for cholecystectomy. In no instance in which the Röntgenogram has shown a septum division have adhesions of the fundus of the gall-bladder been found at operation. Likewise, in no instance of pericholecystitis noted at operation has the distended specimen shown a characteristic external or internal anomaly of the "Phrygian cap" type.

Miliary Calcification in the Spleen.

THEODORE M. BERMAN (*Radiology*, July, 1937) states that the usual calcification observed in Röntgenograms of the spleen is the multiple miliary form presenting numerous small rounded densities averaging from three to five millimetres in diameter. Phleboliths (calcified venous thrombi) and tubercles are the most frequent causes. The lesion may be found under the capsule of the spleen and scattered anywhere throughout the parenchyma. It would appear that most miliary calcifications of the spleen are phleboliths. If the patient presents evidence of tuberculosis of the lungs or elsewhere, then the splenic calcifications may be tuberculous in origin, particularly in children and young adults. The presence of calcified Ghon's tubercle only does not necessarily indicate that the lesions are tuberculous in nature, except in children. In adults the vast majority of cases can be classed as due to phleboliths, and probably should be so considered until proved to be tuberculous.

Diskogenetic Disease of the Cervical Spine with Segmental Neuritis.

ALBERT OPPENHEIMER AND EDWARD L. TURNER (*American Journal of Roentgenology*, April, 1937) state that the primary thinning of intervertebral disks, which has been repeatedly discovered in the lumbar spine, seems to be more common in the cervical spine than in any other segments. It is invariably associated with pain in one or both upper extremities, or in the precordium, or between the shoulder blades, and often with weakness of a group of muscles and even definite muscular atrophy. Symptoms localized in the neck itself are rare. In the authors' series of cases, with one exception, no osteoarthritic changes were observed in the intervertebral joints. The articular facets of the segments involved did not present arthritic changes, but there was in all cases an abnormal position of the facets. Owing to the reduced intervertebral space, the tips of the superior articulating processes of the lower vertebrae approach the bases of the inferior processes of the upper vertebra. In some instances this approximation amounted to actual con-

tact between these bones. Narrowing of the intervertebral space obviously produces shortening of the anterior border of the intervertebral foramen, and displacement of the articulating processes, shortening of its posterior margin. The narrowing of the intervertebral foramen thereby produced is evident in oblique views of the cervical spine. Normally, the intervertebral foramina appear slightly wider in the upper cervical portion, their outlines being marked by a more or less regular oval. In the presence of thinned disks the foramina involved are measurably narrowed and polygonal in outline. This narrowing may be bilateral; in a number of cases, however, it is strictly unilateral. The Röntgen findings described make it evident that the radicular symptoms in this group of cases are not due to some obscure "arthritic" changes, but are produced by direct mechanical bony pressure upon nerve roots. The disease is a pathological entity within the group of primary disk lesions that produce narrowing of intervertebral foramina. Deformations of the vertebrae, such as lipping and "spiculation", may or may not become visible. If present, they are due to consecutive mechanical irritation of the adjacent vertebral surfaces resulting in exostotic formations. For the sake of brevity the expression "disko-genetic disease" is adopted.

PHYSICAL THERAPY.

Radiation Treatment of Epithelioma of the Lip.

WENDALL C. HALL (*The American Journal of Roentgenology and Radium Therapy*, July, 1937) follows up 285 cases of epithelioma of the lip. He finds that 6.3% only occurred in women. Although the lower lip was involved in 88% of the men, the upper lip was involved in 77.7% of the women. In 1933, radium was discarded entirely, since results with Röntgen ray therapy were so successful. This choice, the author states, is not due to any better curative value of one form of irradiation over the other, but to the fact that X ray dosage can be applied more evenly and measured more accurately. The question of the treatment of the glands of the neck, whether apparently invaded or not, is discussed at length, and eventually conservative treatment is considered of greatest value. Two hundred and fifty-eight patients were free of metastasis at their first visit, and as yet in only eight of these (3%) has metastasis occurred in the neck after cure of the local lesion. For this reason the writer is against doing a routine block dissection of the neck or of giving blistering doses of irradiation. Also he remarks that in spite of block dissection it is still not uncommon for metastasis to appear in the dissected area. Local

discrete metastases, which have not perforated the node capsule, should receive 3,000 to 5,000 r external irradiation, preferably by highly filtered deep therapy. At the appropriate time they should then be removed surgically. Small fixed metastases should be exposed surgically and implanted with radon or radium needles after receiving 3,000 to 5,000 r external irradiation. Extensive mass metastases should be given only palliative large doses of external irradiation, since there is no known method of cure, and any drastic measures will probably kill the patient or at least make his condition worse. Such radiation should be applied in daily small doses.

Ultra-Violet Radiation of Erysipelas.

J. G. JENKINS (*Archives of Physical Therapy, X-Ray and Radium*, June, 1937) maintains the quartz mercury lamp at a distance of ten to twelve inches (25 to 30 centimetres) from the patient in order that he may have the advantage of the short rays. Radiation for two to four minutes is sufficient to produce an erythema just short of blistering. No harm is done when the dose is sufficient to cause bleb formation; in severe cases it is even beneficial. He does not treat large areas with one exposure. If after twenty-four hours the temperature has not reached normality or approximate normality, it will be found in the majority of cases that extension of the lesion has taken place. After the first treatment pain and tenderness should be relieved and the spread of the disease should be definitely checked. The reason why ultra-violet radiation relieves the pain in erysipelas has not been explained; it may be due in part to the analgesic effect on the interepithelial nerve endings. Out of 50 consecutive patients with erysipelas treated with ultra-violet radiation, 25 had only one treatment, the temperature returning to normal in two days; 13 had two treatments, the temperature returning to normal in an average of 3.84 days; the remainder had three or more treatments. The entire group had an average of 1.9 treatments, and the temperature returned to normal and remained so in an average of 3.13 days. Of the 50 patients, one died, giving a mortality rate of 2%; this was an infant aged twenty days.

Carcinoma of the Ovary.

LEWIS G. JACOBS AND WILHELM STENSTROM (*Radiology*, June, 1937) class carcinoma of the ovary as being one of the most radio-sensitive epithelial tumours. Diagnosis was made on the microscopic appearance of material obtained at operation or necropsy, but the authors remark that the accuracy of the diagnosis can be no better than the accuracy with which the pathologist is able to distinguish carcinoma from a benign ovarian lesion. For a five-year period

about 35% of patients are alive; those surviving for more than four years and now living were by no means all "favourable cases" at the beginning of treatment. Two patients had extensive peritoneal metastasis, in one case associated with invasion of the bladder; four more patients had, on beginning their course of radiation, definite recurrence after a previous operation. Evaluation of the degree of palliation secured in those patients who died is not possible, but one can safely say that it is a very real amount. Several patients had from a few months to several years of normal or almost normal life before a recurrence finally led to invalidism and death; and even in cases not symptom-free, various degrees of improvement were noted as a rule. Only a few advanced patients failed to receive any benefit from their treatment. The authors state that radiation will produce enough cures in carcinoma of the ovary, even in advanced cases, to make it a decidedly justifiable procedure. The amount of radiation must be adequate, however, and repeated courses are probably advisable.

The Radiumhemmet Experience in Post-Operative Radiological Treatment of Cancer of the Corpus Uteri.

J. HEYMAN (*Acta Radiologica*, February 1, 1937) reports 65 patients with cancer of the corpus uteri who have been observed for five years or longer. In every case the diagnosis has been verified by the chief of the pathological department of the Radiumhemmet. Fourteen patients died within five years, three from intercurrent disease. All recurrences, except one, occurred within twelve months; no recurrence has occurred after eighteen months. In six of the patients with local recurrence complete radical operation has not been possible on account of involvement of the parametrium. Of the 65 patients, 52 were submitted to total and thirteen to subtotal hysterectomy. The reason that at times subtotal hysterectomy was performed instead of total hysterectomy was that seven patients were thought to have fibroid growths, in three cases there were technical difficulties, and in two cases the general condition was bad. The interval between operation and post-operative irradiation is considered to be of significance. Those patients given irradiation less than four weeks after operation appeared to do better than those for whom it was delayed. According to the author's experience, radiation treatment should begin as soon as possible after operation, and should include both radium and X ray treatment. The results obtained at the Radiumhemmet in post-operative radiation treatment of 65 patients operated upon for cancer of the corpus uteri are given: a five-year cure was obtained in 78.5% of cases and a ten-year cure in 61.1%.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Queensland Branch of the British Medical Association was held at the Mater Misericordiae Public Hospital, South Brisbane, on February 5, 1937. The meeting took the form of a series of demonstrations by the members of the honorary medical staff.

Malnutrition due to Syphilis.

Dr. H. MATHEWSON showed a child, aged twelve months, who had been admitted to hospital on November 10, 1935. The weight of the child at birth had been 4.05 kilograms (eight pounds fifteen ounces). The child was breast fed. There were four other children in the family. The blood of the mother, father and one sister failed to react to the Wassermann test.

The child had been well until three weeks previous to admission; he then became irritable and slept very little. He had taken his food well till three days previously, and there had been no vomiting. At the time of admission the temperature was 37.5° C. (99.4° F.); the anterior fontanelle was depressed; examination of the thorax, abdomen and central nervous system revealed no abnormality. A diagnosis of "intestinal upset" was made. On November 12, 1935, the child was being fed with half-strength breast milk, taking each breast for five minutes. Feeding was difficult. On November 19 a rash appeared on the arms and legs; the fingers and toes were pink. He still took his food badly, and the result of a test feed was unsatisfactory. On November 26 undigested food and much mucus appeared in the stools. The skin was peeling from the hands and feet. On November 30 the child was vomiting. A blood count revealed 4,060,000 red cells and 11,300 white cells per cubic millimetre of blood. The haemoglobin value was 75% and the colour index 0.9. The neutrophile cells were in the proportion of 68%, and lymphocytes 32%. Anisocytosis, poikilocytosis and polychromasia were present. On December 10 "Lactone" syrup milk in a dose of 240 cubic centimetres (eight ounces), every four hours, and orange juice were given. On December 19 the motions were offensive and contained mucus, but the vomiting had ceased. A blood count made at this time revealed 4,230,000 red cells and 10,300 white cells per cubic millimetre of blood, a haemoglobin value of 72% and colour index 0.8. Neutrophile cells were in the proportion of 67% and lymphocytes 33%. The colitis had decreased.

On January 7, 1936, the rash on the body was pronounced and the child had become more restless. On January 14 the quantity of food was increased; seven days later the motions were watery, dark brown and frequent, and the child was given powdered apple; on January 27 he was given whey and Mellin's food and modified milk in feeds of 135 cubic centimetres (four and a half ounces) every two hours. The administration of grated apple was continued, and the condition of the stools improved. The amount of modified milk in the food was increased and the whey decreased by 15 cubic centimetres (half an ounce) every second or third day. On February 15 the administration of olive oil was commenced. It was given in a dose of 0.06 cubic centimetre (one minim) twice a day. The dose was increased by 0.06 cubic centimetre (one minim) every other day, until 0.36 cubic centimetre (six minims) was being taken. At the same time one teaspoonful of scraped raw meat was given daily. On February 27 the child was having modified milk with Mellin's and Benger's food every two hours, with barley jelly added. The meat was increased in amount to two teaspoonfuls. The administration of olive oil was suspended. On March 5, 1936, inunctions of mercury were commenced; "Marmite" and rusks were added to the diet. On March 14, 1936, the child reacted to the Wassermann test. On March 30 the inunctions were suspended, and on April 1 "Cal-Bis", in a dose of 0.25 cubic centi-

metre, was given intramuscularly. On April 7 there was a pustular eruption in the groins and on the back of the neck. The next day "Cal-Bis" (0.15 cubic centimetre) was injected intramuscularly. Three days' freedom from treatment were then allowed. Inunctions were then given for three days, as well as injections of "Cal-Bis", in gradually increasing doses up to 0.5 cubic centimetre of the fourth day. On April 24 the child was having cereals, broth, raw meat and "Marmite", groats and milk, with Mellin's food. On May 1, 1936, the child was given liver cocktail, in a dose of four cubic centimetres (one drachm) daily, and "Hypol", in a dose of 0.18 cubic centimetre (three minims) three times a day. The inunctions and injections were continued.

Acholic Jaundice.

Dr. Mathewson's second patient was a girl, aged nine years, who had been admitted to hospital on October 5, 1936, her complaint being that her eyes were yellow. The history was given that, during 1935, the child had been listless; she had complained of abdominal pain, with nausea, and had been jaundiced. She had recovered after an illness lasting three weeks. In October, 1936, the child complained of abdominal pain and nausea; she had intermittent loss of appetite. She was jaundiced; lymphatic glands were not palpable; the lower border of the spleen was palpable 2.5 centimetres (one inch) below the umbilicus, and the liver was palpable below the costal margin; there was a systolic murmur at the mitral area. On October 5, 1936, a blood count revealed 2,210,000 red blood cells and 10,800 white cells per cubic millimetre. The neutrophile cells were in the proportion of 54%, lymphocytes 42%, eosinophile cells 1%, and myelocytes 3%. The haemoglobin content was 42% and the colour index 0.9. Normoblasts and megaloblasts were present, and there were anisocytosis, polychromasia and poikilocytosis. There was a slight increase in fragility of the red cells, haemolysis being complete in 0.4% saline solution and slight in 0.5% saline solution. There was an indirect reaction to the Van den Bergh test, and there was also a slight delayed direct reaction. On October 20, 1936, the red cell count had fallen to 1,650,000 per cubic millimetre; the haemoglobin content was 42%. A diagnosis of familial acholic jaundice was made and the child was treated with intramuscular injections of "Campolon". On October 24, 1936, splenectomy was performed; this was followed by blood transfusion. After the operation the child was given 1.8 grammes (thirty grains) of *Ferri et Ammonii Citras* daily; this was later increased to 2.7 grammes (forty-five grains) a day. On November 18, 1936, the red cell count had risen to 3,380,000 per cubic millimetre and the haemoglobin content to 68%. There was a satisfactory improvement in the anaemia and in the child's condition. She was discharged from hospital on November 23, 1936.

Ulcer of the Skin.

Dr. H. J. WINDSOR showed a patient, aged two and a half years, who had been admitted to hospital on January 13, 1937, with the history of having had an ulcer of the skin for eleven months. Thirteen months previously a lump had been noticed on the outer side of the right thigh; this had broken down in February, 1936, to form a discharging ulcer, which resisted all treatment. In November, 1936, a similar lump, had appeared on the left hip. As a result of scarring of the ulcer on the right thigh a contraction deformity of the right knee had appeared. The family history gave no evidence of tuberculosis or venereal disease. There was a slight reaction to the Mantoux test at a dilution of 1 in 1,000, but no reaction at 1 in 10,000. The child did not react to the Wassermann test. A blood count revealed 4,240,000 red cells and 6,100 white cells per cubic millimetre of blood, neutrophile cells being in the proportion of 52% and lymphocytes 48%. The haemoglobin value was 86%, and the colour index 1.0. Pathological examination of a snipping from the ulcer revealed that it was a chronic granulomatous ulcer, its origin not being apparent.

Congenital Absence of Recti Abdominis Muscles and Partial Exomphalos.

Dr. Windsor's second patient was a child suffering from congenital absence of *recti abdominis* muscles. The mother's pregnancy had been normal; but labour had been somewhat prolonged. The umbilical cord was unusually short, and the placenta had separated early, resulting in moderate *post partum* hæmorrhage. At the time of birth the umbilical cord was very thin, but had an apparently normal attachment. Above the attachment was a hernial protrusion extending to the xiphisternum, with so thin an external covering as to make the abdominal contents visible. The cord separated on the fourth day, the resulting cicatrix curtailing to some extent the lower bulge of the hernia. The baby's general condition was good.

The child was admitted to hospital on October 5, 1936. Her weight was 3.5 kilograms (seven pounds eleven ounces) and the only apparent abnormalities were the absence of the *recti abdominis* muscles and the hernial protrusion. The child was breast fed every three hours.

Operation was performed on October 7, 1936, after preliminary medication consisting of a hypodermic injection of atropine sulphate in a dose of 0.001 gramme (one-sixtieth of a grain). An upper mid-line incision was made; the tissues were dissected and the layers defined, and redundant tissue was removed. A sheet of *fascia lata*, obtained from the father's thigh, was placed in position subcutaneously and oversewn with further strips of *fascia lata*. Post-operative medication consisted of a hypodermic injection of morphine sulphate in a dose of 0.0005 gramme (one one-hundred-and-twentieth of a grain). The sutures were removed on the ninth day. Progress was uneventful apart from some purulent discharge and, later, a little sloughing at the edges of the wound. The child gained in weight and was discharged from hospital on January 8, 1937.

Acute Appendicitis.

Dr. Windsor also showed a boy, aged five years, who had been admitted to hospital on October 21, 1936, at 7.30 p.m., suffering from vomiting and pain in the lower part of the abdomen. Examination revealed tenderness and muscular guarding in the right lumbar region. The diagnosis of acute appendicitis was made, and at operation an acutely inflamed appendix was removed. The temperature remained raised, and on October 24 was 39.4° C. (103° F.). The child was very irritable, crying frequently, and complained of thirst. The abdomen was slightly distended. The child vomited frequently. The pulse became rapid and the abdomen more distended. On October 27 laparotomy was performed under local anaesthesia. Free pus was found in the peritoneal cavity. The wound was closed and drainage was provided. The vomiting continued and gastric lavage was employed without effect. The distension was still more marked, and turpentine stupes were applied, also without effect. The child was given saline solution by subcutaneous injection on October 28, and 513 cubic centimetres (eighteen ounces) of glucose (11%) in normal saline solution on October 30. Gastric lavage was employed frequently to relieve the vomiting; the distension was very great. On October 31 a glycerine enema was given; some flatus and stool were passed, with no relief. On November 2 pituitrin was given and a course of injections of acetylcholine was commenced, with some effect. Gastric lavage was employed twice a day, and there was very little vomiting. On November 3, 0.25 cubic centimetre of "Spinocaine" was injected intrathetically, with slight effect. On November 4 pituitrin injections and a quinine sulphate enema brought no relief and seemed to cause more vomiting. The distension had now lasted for twelve days; the temperature was 38.3° C. (101° F.) and the pulse rate 140 per minute. Calomel, in a dose of 0.03 gramme (half a grain), was given every half hour for four doses, with complete relief of the distension. There was slight fever for two weeks; but the wound healed, the child improved, and was discharged from hospital on December 19, 1936.

Pulmonary Suppuration.

Dr. P. A. EARNSHAW showed four patients suffering from pulmonary suppuration. These cases will probably be reported in a later issue of the journal.

Chronic Ulcerative Colitis.

Dr. Earnshaw also showed a girl, aged nine years, who came from the northern rivers district of New South Wales. About the middle of 1936 she began to suffer from chronic ulcerative colitis. There were occasional remissions and exacerbations of the disease. The last exacerbation prior to her admission to hospital commenced on January 20, 1937. She suffered from diarrhoea and had on the average ten motions a day. The motions contained mucus, pus and much blood. In this exacerbation she vomited for the first time. At the time of admission the child was thin and somewhat pale. The motions were as described above. No other abnormality was found beyond acutely inflamed tonsils.

A blood count and examination of the stomach contents revealed no abnormality. On January 22 she was given the raw apple diet, having a grated raw apple every hour during the day and every two hours during the night. Much persuasion was necessary to induce her to take the apple after the first few hours. She greatly improved, and in three days the motions had the appearance of faecal-stained apple pulp, there being no blood or mucus.

By February 4 the amount of apple was reduced to one every four hours, and in addition she was given any of the fruits in season, well mashed up. She was then having one or two motions a day.

On February 15 Dr. Quayle examined the throat and advised the removal of the tonsils and adenoids. The patient's diet was gradually increased, mashed vegetables being added and, later, milk.

The milk was given too early, for on February 22 the patient had two to four loose offensive motions, and again looked ill. The stools contained no mucus or blood. The patient was then given apple every two hours during the day and every four hours during the night. When the motions were again normal the diet was increased, and when milk was given it was administered in the form of lactic acid skimmed milk, small quantities only being given at first and the amount gradually increased. At the time of the meeting there had been no further relapse and the patient looked well. The motions had been normal except for the presence of a trace of blood on two occasions. Dr. Earnshaw said that it was intended to increase the diet gradually. Lactic acid whole milk would be given later and the amount of lactic acid gradually diminished. The patient would have to take about six apples a day for many months after leaving hospital.

Rickets.

Dr. Earnshaw's sixth patient was a boy, aged one and a half years, who came from the northern rivers district of New South Wales. The child was illegitimate. During her pregnancy and while nursing the child, the mother lived in an institution where, she said, she had to work hard. As the child was brought to Brisbane by a grandparent who knew little of the mother's diet in the institution, and the mother herself never appeared, no knowledge of the diet could be obtained. However the grandparent stated that the child cried much from hunger while in the institution. Dr. Earnshaw said that it was likely that the mother's diet and the child's diet had both been defective. At the age of six months the child had been weaned and given "about equal amounts of milk and water". The quantity was not known. The grandmother had had charge of the boy since the age of ten months, and she stated with evident satisfaction that she had given him "bread, jam, biscuits and everything".

The child sat up at ten months and walked at fifteen months. The first tooth appeared at seven months. He had a "cold" when cutting each tooth. The mother was alive and well, and this was her only child.

When examined the child was seen to be very bandy. The bandiness was said to have appeared as soon as he had begun to walk. There was thickening of the lower

ends of the femora and upper ends of the tibiae. There was slight enlargement of the cartilages at the costo-chondral junctions and of the lower ends of the radius and ulna. The bones most involved were the tibiae and femora. There was bossing of the cranial bones; but the fontanelle was closed. The condition of the teeth was excellent. The spleen and lymphatic glands were not palpable.

X ray examination showed spreading of the lower ends of the femora and upper ends of the tibiae. Similar changes were present to a less degree in the distal ends of the radius and ulna. The appearance was that of healing rickets. Dr. Earnshaw said that the case was interesting because of the rareness of well-marked rickets in Queensland. Dr. Earnshaw stated that this was only the third patient that had come under his care in thirteen years' private and public hospital practice, and this patient came from New South Wales. Minor defects that may result from rickets, such as knock-knee and flat-foot, were seen in Queensland.

Another matter of interest was that the lower limbs were more obviously affected with rachitic lesions than the upper limbs. Usually the upper limbs were more affected, because in crawling there was more weight on the wrists. When rickets was late in developing, however, the knees were affected to a greater extent, as by this time the child had begun to walk. In the case under discussion the defective institutional diet of the mother and later on the defective infant diet were probably responsible. In the institution it was likely that the child had been kept in a crib, with no access to the sunlight and little opportunity to crawl, so that the wrists had done little weight-bearing, and there was slight consequent deformity of the upper limbs. When passing later into the grandmother's care, no doubt the boy had been taken out into the sunshine and had enjoyed greater activity. The solar rays had probably been the chief healing agent in this case, but too late to prevent deformity, which had appeared when he had begun to walk. Dr. Earnshaw said that the excellent condition of the teeth was also remarkable. Dr. Meehan had seen the boy and had advised corrective irons for the bow legs. It was impossible to obtain sufficient blood for biochemical investigations.

Still's Disease.

Dr. Earnshaw's seventh patient was a girl, aged four years and six months, who came from south-western Queensland. In August, 1936, the child was immunized against diphtheria. Following the injections for immunization the wrists and knees became swollen. Several teeth were later removed and the child was also given injections of a vaccine. The child later had swellings of the ankles and pain in the hip joints. The father was a returned soldier suffering from "rheumatics". The child was admitted to hospital in December, 1936. She was thin and pale. There were swellings of the wrist, proximal interphalangeal joints, knees and ankle joints. There was fluid in both knee joints. The spleen was not palpable. The axillary, epitrochlear and inguinal glands were palpable. The upper incisor teeth were poorly enamelled. The tonsils were unhealthy. The reflexes were exaggerated.

While the patient was in hospital the temperature varied between 37.2° C. (99° F.) and 37.8° C. (100° F.), and the pulse rate between 90 and 124 per minute. Her tonsils were removed in January, 1937. The blood count was normal. A fractional test meal examination was made. The total amount of acid rose to 40% and the free hydrochloric acid to 20%.

The lower limbs and wrists were placed in splints. With the exception of the proximal interphalangeal joints, the joints were now no longer swollen. The axillary and epitrochlear glands were still palpable.

Dr. Earnshaw said that this condition of rheumatoid arthritis in children, or Still's disease as it was often called, was not common; but it had a special interest in that its recognition in children was the means of separating rheumatoid arthritis in adults from osteoarthritis. The similarity of the two conditions was recognized by the

discovery, when looked for, of enlarged glands draining the affected joints in adults. There was also the possible relationship between rheumatoid arthritis and true rheumatic infection. The two diseases had many similarities. The onset of rheumatoid arthritis was sometimes so acute that the disease was mistaken for acute rheumatism. Though endocarditis was rare in rheumatoid arthritis, it did occur. The nodules, though differing clinically, had similar appearances on microscopic examination; also occasionally rheumatoid arthritis might follow acute rheumatism.

Staphylococcal Septicæmia.

Dr. Earnshaw finally described a female child, aged fifteen weeks, who had been quite well until December 15, 1936. She was breast fed. The first symptoms noticed were a creamy appearance of the stools and yellowness of the urine. A motion was passed after each feed. The skin was very slightly jaundiced. There had been another child who had died from hæmorrhagic disease of the newly born. The mother had also had a miscarriage at two and a half months.

The child was first seen by Dr. Earnshaw on December 20, 1936, the fifth day of the illness. No abnormality was found in the course of the examination beyond some slight abdominal distension and some vague abdominal tenderness. The liver was normal in size and the spleen was not palpable. The red blood cells numbered 4,960,000 and the white cells 11,200 per cubic millimetre of blood. The hæmoglobin value was 96% and the colour index 0.9. Neutrophile cells were in the proportion of 28%, lymphocytes 59%, and eosinophile cells 13%. The red cells were normal in appearance. Platelets were abundant. Results of the fragility test were normal. The reticulocyte count was 7%. There was no reaction to the Wassermann test. There was an immediate direct reaction to the Van den Bergh test. No bile pigment was found in the urine and no abnormality was found during a microscopic examination. On the seventh day the motions were tinged with yellow.

On the ninth day the patient had a temperature of 38° C. (100.4° F.). She was then admitted to the Mater Misericordiae Children's Hospital. On the thirteenth day the child was very pale. She had passed three large tarry stools. The abdomen was distended.

The examination of a stool revealed the presence of red blood cells, occult blood and an occasional pus cell. The red blood cells numbered 2,620,000 and the white blood cells 27,600 per cubic millimetre. The hæmoglobin value was 50% and the colour index 0.9. Neutrophile cells were in the proportion of 54%, lymphocytes 44% and eosinophile cells 2%. There was slight anisocytosis, and there were poikilocytosis and polychromasia. The platelets were numerous. An occasional megaloblast was seen. A Van den Bergh test produced no reaction.

On the sixteenth day there were a few small petechiæ on the left leg. Blood was withdrawn from the superior sagittal sinus and *Staphylococcus aureus* was cultivated from it.

The petechiæ disappeared in a couple of days. The patient steadily became worse and died on the twenty-fifth day of the illness. While she was in hospital the temperature was raised and varied mainly between 38.3° C. (101° F.) and 39.4° C. (103° F.). There was no recurrence of the petechiæ until just before death, and there was no further melena.

Post mortem examination revealed no abnormality in the lungs, heart or alimentary tract. There was much clear fluid in the peritoneal cavity. The liver was pale and studded with numerous small abscesses. The spleen was normal. The kidneys were very pale, and occasional small abscesses were seen in the right kidney.

Dr. Earnshaw said that the patient had obviously suffered from staphylococcal septicæmia, though it had been impossible to discover the portal of entry of the organism. The umbilicus had been normal, and the mother had stated that it had healed soon after the birth of the

infant. It was remarkable that the first Van den Bergh test should have produced an immediate direct reaction. The liver, which had been removed at autopsy, was then exhibited.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal Prince Alfred Hospital, Sydney, on June 3, 1937. The meeting took the form of a series of clinical demonstrations by members of the honorary staff.

Recurrent Hyperthyroidism, Parkinsonism and Glycosuria.

DR. ALLAN WALKER showed a patient with recurrent hyperthyroidism associated with Parkinsonism and glycosuria. This woman, aged fifty-five years, had complained of weakness and lassitude for six months. Partial thyroidectomy had been performed for toxic goitre in 1920, and she had remained well for twelve years, after which time recurrence of the hyperthyroidism had occurred but had been controlled by radiation therapy. The patient had remained well till two years previously, when a tremor appeared on the left side of the body. In the last six months she had lost two stone in weight and had been considerably incapacitated. On admission to hospital she presented a striking picture which was not so clear at the time of demonstration. On the left side there was a coarse, non-intentional tremor of the Parkinsonian type; the left leg was slightly weak and was lifted with a little difficulty on going up steps; the lid of the left eye drooped slightly. On the right side there was a very fine tremor of the hand, and there was a definite exophthalmos with widening of the palpebral fissure. The skin was moist. No complaint was made of frequency of micturition or of thirst. The pulse was rapid (120 per minute); the systolic blood pressure was 180 and the diastolic blood pressure 80 millimetres of mercury. The urine did not contain sugar or ketone bodies; the basal metabolic rate was 51% above normal standard. The fasting blood sugar was 159 milligrammes per centum, and the figures at half-hourly intervals after injection of glucose were 290, 300, 270 and 290. The blood cholesterol was 120 milligrammes per centum.

The patient was treated by radiation, and during the early part of her course of treatment she suffered a paroxysm of auricular fibrillation, with gross glycosuria and ketonuria. Digitalis and insulin soon controlled this condition, which subsided completely. Her signs had now become much less striking, but the contrast between the left side of the body and the right side, which showed different lesions, was still in evidence. Another interesting feature was the presence of pigmentation of the skin of a patchy type over the trunk and limbs; this had occurred at the time of the original hyperthyroidism and had persisted since.

Supposed Disseminated Sclerosis.

Dr. Walker's second case was that of a young man aged twenty-four years. Over two months previously he had noticed weakness of the legs, which was painless and came on while he was in camp. The feet were sore for a day, and then he lost control over the legs and feet, feeling unable to put them in the right place. On examination at this time the patient had weakness of the thighs, legs and feet, especially on the right side. There was paresis of the flexors of the right foot. Some hyperaesthesia was then found below the tuberosity of the right tibia, but all sensation in the right calf, right sole and the saddle area was dulled. Deep sensation was much impaired in both legs, and vibration sense was absent from the right leg. No disturbance of eye movements or of reflexes existed at this time, nor was there any bladder disturbance. Neither the blood nor cerebro-spinal fluid reacted to the Wassermann test, and the latter contained no increased number of cells. While in hospital the patient had ataxia of the lower limbs, but both this and the muscular weakness cleared up within a few weeks. At this time the diagnosis of encephalomyelitis was made, and restoration

of power and sensation was confidently predicted. However, the patient had returned to hospital a month previously with diplopia due to weakness in the medial rectus and to a less extent in the inferior oblique muscle of each eye. The right foot flexors were again weak, and there was an ankle clonus on both sides. The plantar reflexes were flexor in type. Sensation was hardly disturbed. The muscular weakness in the legs had disappeared, but the eye palsies had persisted up till a few days previously, when they had practically disappeared. At the time of demonstration this patient showed some slight disability in walking: he tended to throw out the right foot slightly, and could not stand on the right leg alone without difficulty. The eyes were not completely under control, but he could read with both eyes simultaneously at the cost of only a certain degree of fatigue. Dr. Walker pointed out that the curious remissions were strongly suggestive of disseminated sclerosis, but that some features were unusual, particularly the predominance of sensory change on the first occasion. Moreover, this was a distinctly uncommon disease in native-born Australians, and there had been in recent times numbers of cases of infection of the central nervous system of the encephalitic type.

Electrocardiographic Demonstration.

Dr. Walker also showed two electrocardiograms. The first of these had been taken from a boy, aged sixteen years, who had been admitted to hospital in an attack of paroxysmal tachycardia. The particular interest in this case lay in the severity of the attack and the rapidity with which signs of congestive failure had developed. Similar attacks of less severity had been observed for some time past, causing fainting at times, and the patient had been breathless on exertion for the past two years. There was no history of rheumatism. After four days of tachycardia he suddenly died, his condition having been bad from the outset, delirium being present and the heart rate being 160 to 180. The rhythm was regular, but the rate was not invariable, and it was reduced to about 120 after the intravenous administration of digoxin. Neither digoxin nor quinidine was successful in breaking the paroxysm, and the usual manoeuvres also failed. The liver became rapidly enlarged and tender, congestive signs appeared in the lungs, and vomiting was persistent. In this case the electrocardiographic picture was that of the common supraventricular type of tachycardia due to recurrent extrasystoles, but there was nothing but the patient's clinical state to indicate the seriousness of his condition. *Post mortem*, an hypertrophied and grossly dilated heart was found, whose macroscopic appearance was that of a fatty degenerative state. Microscopic section confirmed this, and no histological evidence of an inflammatory lesion, such as a rheumatic carditis, was found.

The second electrocardiogram shown by Dr. Walker was that of a healthy male, aged eighteen years. This tracing could be called an electrocardiographer's nightmare. It showed numerous extrasystoles more or less coupled to normal complexes, together with inversions of the T waves in Leads II and III. After the patient had taken exercise, instead of the irregularity disappearing, it was enhanced many fold, the increase of the heart rate being brought about by bouts of tachycardia of the paroxysmal type. This extraordinary mechanism should apparently be regarded as the method normal for this subject, who was perfectly fit in all ways. A standard exercise tolerance test caused no dyspnoea, but the heart did not settle to its previous state till after three or four minutes had elapsed. The interest of this case lay in the fact that the irregularity had been accidentally discovered, and that the "patient", if he could be so called, was an athletic young man who could run a mile in under five minutes. He had no symptoms and there had been no history of rheumatism or other relevant infection.

Pituitary Dwarfism with Diabetes Mellitus.

DR. KEMPSON MADDOX showed a boy, aged sixteen years, who had been known to be diabetic for nine years. He had grown about five centimetres (two inches) in two

years and had gained about half a stone in weight. His actual weight at the time of the meeting was four stone ten pounds, instead of eight stone, and his height was four feet four inches, instead of five feet five inches.

During the preceding nine years he had had frequent attacks of coma and precoma, and he had been extremely difficult to control from the point of view of carbohydrate metabolism. He exhibited extreme and very rapid falls in the blood sugar while receiving ordinary insulin; within one hour of manifesting abundant glycosuria he would have a convulsion. These convulsions for a long while were diagnosed as being epileptic. A high carbohydrate diet with buffer meals prevented their occurrence to some degree, but a bad social background and the patient's own moral unreliability resulted in frequent glycosuria. He received three injections of insulin a day, totalling 80 units in all. He had recently been admitted to hospital and given protamine zinc insulinate, which was increased from the basal dose of 30 units in the morning to 70 units at a time. This had resulted in a considerable smoothing out of the daily blood sugar curve and of the occasional hypoglycæmic attacks at night. The mid-morning specimen of urine, however, continued to contain sugar, and the patient was given 25 units of ordinary soluble insulin mixed with the protamine zinc insulin. This reduced the blood sugar to such a level that the glycosuria was found in small quantities in the afternoon and evening specimens of urine. In addition, the diet was split up into six meals per day instead of three. At the present time he was receiving a diet of 1,800 calories, but it was hoped to increase this slowly to at least 2,000 calories. On examination he was seen to be very considerably but proportionately stunted in all parts of the body. The form of the hands was especially striking and similar to that seen in pituitary dwarfs of the Lorain type. His belly was protuberant, but the liver was not enlarged. All systems were normal to the usual clinical survey. An X ray examination of the skull revealed no definite lesion, but the *sella turcica* was small and the sphenoidal sinus very poorly developed for a child of thirteen years. No lesion was detected in the bones of the wrist or knee. There was no reaction to the Kline and Wassermann tests; the systolic blood pressure was 100 and the diastolic blood pressure was 60 millimetres of mercury. There was no evidence of renal insufficiency. No treatment with any of the newer pituitary extracts had been attempted.

Dr. Maddox said that the boy probably suffered from a primary pituitary deficiency or from absence of a growth factor associated with disturbance of the carbohydrate metabolism similar to that occurring in ordinary juvenile *diabetes mellitus*. This was of interest in view of the increasing importance now attached to the pituitary gland in the aetiology of diabetes.

Dyspituitarism of the Brissaud-Fröhlich Type with Asthma.

Dr. Maddox's second patient was a girl, aged eleven years, who had first attended hospital on account of abdominal pain and had been recommended for admission for appendicectomy. She was subsequently referred to the medical out-patient department because of a dry continual cough. Her tonsils were enlarged and were subsequently removed. She still had some respiratory symptoms, and, according to the mother, sometimes had attacks of choking and gurgling. X ray examination of the chest was made with a view to discovering the size of the thymus gland, but apart from a small healed Ghon's focus in the right intracavicular region, no abnormality was apparent. The choking attacks had since shown themselves to be those of bronchial asthma. Late in 1936 she had bronchopneumonia, followed by two convulsive seizures, which the in-patient physician described as being rather like tetany. She made a good recovery and left hospital without any abnormal signs in her chest. She had always been fat, especially about the loins and buttocks. At the time of the meeting she weighed seven stone ten pounds and had the rounded, tubby face of the Brissaud type of dyspituitarism. She had not grown at all during the six months of observation, and continued

to suffer from attacks of bronchial asthma. She was found to be sensitive to duck feathers and to house dust, and was still receiving graded injections of these substances. Reduction diet had proved ineffective; whole pituitary and thyroid gland had been given without much apparent effect.

Dr. LINDSAY DEY and Dr. RAYMOND GREEN agreed that the stout girl was of the Fröhlich habitus, and inquired whether any of the newer pituitary extracts had been used in treatment.

Dr. T. LAVERY asked the same question, and said that he had had success in this type of case with injections of "Antuitrin S" in enlarged doses.

Dr. Maddox, in reply, said that the preparation of pituitary gland used in these cases had been that of whole pituitary gland (Parke, Davis and Company) in one-grain tablets. The patient had been unable to afford more expensive preparations.

Polyneuritis.

Dr. A. W. MORROW showed a man, aged forty-one years, who in June, 1936, had noticed loss of energy, and had stated that he was easily fatigued. This state of affairs lasted until November, 1936, when he commenced to notice weakness in his legs and arms. In December, 1936, tingling and pain were added to this sense of weakness, and he noticed his gait was staggering. His loss of power continued to progress, as also did the tingling pain and the lack of coordination. He was seen at the end of December, 1936, when it was found that he had weakness in his arms and legs, with some generalized wasting and loss of all the deep reflexes. He was admitted to the Royal Prince Alfred Hospital on December 29, 1936, and the symptoms continued to progress for some four or five weeks. For three to four days he had retention of urine, and later, for three days, incontinence of faeces. Since then he had steadily improved. There was no history suggestive of vitamin deficiency, nor did investigation of the urine reveal the presence of lead or arsenic. He had not been taking any drugs or alcohol.

Neither the blood nor the cerebro-spinal fluid reacted to the Wassermann test. There was no increase in the pressure of the cerebro-spinal fluid nor in the number of cells, but the protein was increased, the total protein being 50 milligrammes *per centum*. Lumbar puncture, repeated on March 18, 1937, still revealed increased globulin, but no increase in cells. The Lange gold curve was 0000123321. Dr. Morrow said that the patient furnished an example of extensive polyneuritis of unknown origin. His blood count on admission to hospital revealed 10,000 leucocytes per cubic millimetre, but was otherwise normal, and on several subsequent examinations was completely normal.

Subcutaneous Gangrene.

Dr. JOHN S. MACMAHON showed a man, aged twenty-eight years, who had been admitted to the Royal Prince Alfred Hospital on October 3, 1936. Appendicectomy had been performed in the country for chronic appendicitis six months previously, and the wound had not healed. At the time of admission there was an ulcer at the site of the previous operation wound, 5.0 by 2.5 centimetres (two inches by one inch), the base of which was covered by unhealthy greyish and oedematous granulations. The edge of the ulcer was undermined so that a probe could be passed for a distance of about ten centimetres (four inches) in all directions. Excision by diathermy of the overlying skin beyond the undermined edges was carried out on November 18, 1936. In spite of excision the undermining of the skin continued to spread down the right thigh, and excision by diathermy had to be carried out on five further occasions. The condition was finally arrested about 7.5 centimetres (three inches) above the level of the right patella. Skin grafting was carried out on three occasions. Bacteriological examination of the pus showed the presence of anaerobic hæmolytic streptococci and staphylococci.

Dr. MacMahon said that during his illness the patient had complained bitterly of pain, which appeared to be a

characteristic of the disease. Diathermy excision seemed to be the only certain means of limiting the spread. It was necessary to excise the edge only (skin and fascia), as the infection did not usually extend beyond the deep fascia. Packing the undermined edge with zinc peroxide paste in this case had not limited the spread.

Gumma of the Liver.

Dr. MacMahon next showed a woman, aged fifty years, who had been admitted to the Royal Prince Alfred Hospital on May 18, 1937, with the complaint that she had suffered from recurrent attacks of epigastric pain during the previous six months. X ray examination carried out six months previously had revealed the presence of gall-stones. Two weeks before admission she had suffered from an attack of severe pain in the epigastrium and left hypochondrium. Her temperature was 37° C. (98.6° F.). A mass could be felt in the subcostal region. It was the size of an orange, moved with respiration and was very tender. There was a reaction to both Casoni and Wassermann tests.

The patient admitted having had syphilis in 1923, when she had been treated by injections of arsphenamine over a period of twelve months. The treatment had been commenced shortly after the appearance of the rash.

On May 28, 1937, exploratory laparotomy was carried out. A large irregular tumour of the left lobe of the liver, the size of a small orange, resembling a large secondary carcinoma, was found. A needle was inserted and the tumour was found to be solid. No hydatid could be found. There were recent adhesions between the tumour of the liver and the abdominal wall. Pathological examination of material removed for biopsy revealed gumma of the liver. At the time of the meeting the patient was being treated with large doses of potassium iodide.

Congenital Absence of the Pectoral Muscles.

Dr. MacMahon's next patient was a boy, aged seven years. The patient's father had first noticed a flattening of the right side of the chest about three and a half years before. He was ambidextrous and was able to indulge in and excel in many branches of sport, apparently without any disability. There was complete absence of the *pectoralis major* and *pectoralis minor* muscles from the right side.

Hirschsprung's Disease.

Dr. MacMahon also showed a girl, aged four years, who had suffered from constipation all her life. Her mother had been in the habit of giving her an enema three times a week and aperients on other days. Constipation had increased, and occasionally the child had passed blood *per rectum*. The child's appetite was poor; but she did not vomit. Slight abdominal distension was the only physical finding.

X ray examination revealed great distension of the colon, characteristic of Hirschsprung's disease. On August 26, 1936, sympathectomy was performed by Dr. E. Fisher. The posterior abdominal wall was exposed by incising the peritoneum through the abdominal cavity at the level of the brim of the pelvis. The presacral nerves were dissected out and cut. The bowels opened naturally one week after the operation and had continued to act normally ever since the patient's discharge from hospital. Although her bowels acted naturally and she had no abdominal distension, radiographically the appearance of megacolon was still present.

Diaphragmatic Hernia.

Dr. MacMahon's fifth patient was a woman, aged sixty-five years, who had been admitted to the Royal Prince Alfred Hospital on August 8, 1936, complaining that she had had difficulty in swallowing for four years. Three years before her condition had been diagnosed as carcinoma of the oesophagus. She had lost 18.9 kilograms (three stone). For the previous two years she had been able to swallow fluids only. Dr. MacMahon said that the fact that she had remained comparatively well for two years was sufficient evidence that she had not a carcinoma

of the oesophagus, but some other condition causing difficulty in swallowing.

X ray examination on August 8, 1936, revealed a rather large para-oesophageal and diaphragmatic hernia of the type in which the oesophagus was short. The oesophagus ended at the level of the tenth dorsal vertebra. There was no evidence of carcinoma. There were two small duodenal diverticula close to the duodeno-jejunal junction. Oesophagoscopy performed by Dr. G. Halloran confirmed the X ray diagnosis.

As it was difficult to ascertain radiographically whether a patient had a short oesophagus or not, it was decided to determine this by operation.

On August 21, 1936, operation was performed by Dr. E. Fisher. A para-oesophageal hernia was found, containing about 7.5 centimetres (three inches) of stomach, which could easily be withdrawn into the abdomen. There was no shortening of the oesophagus as suggested by X ray examination. The opening through the diaphragm admitted three fingers and was apparently caused by the congenital absence of the left crus. The opening in the diaphragm was closed with kangaroo tendon sutures, and the fundus of the stomach was fixed to the inferior surface of the left cupola of the diaphragm.

The patient made an uneventful recovery and was able to eat solid food in one week. At the time of the meeting she was comparatively well and had gained 15.8 kilograms (two and a half stone) in weight. She was able to eat solid food, but at times with some difficulty. There was apparently an associated achalasia of the cardio-oesophageal junction, with some dilatation of the oesophagus above it, to account for this. Such an association in para-oesophageal hernia had been commented upon by other observers.

Imperforate Anus and Recto-Vaginal Fistula.

Dr. MacMahon's last patient was a girl, aged nine years, who had been born with imperforate anus and recto-vaginal fistula. Fluid faeces ran away continuously through her vagina. She occasionally suffered from generalized abdominal pain and vomiting and was rather weak and sickly. There was a puckered anal dimple, which contracted on skin stimulation, showing the presence of either *corrugator cutis ani* or external *sphincter ani*. The abdomen was slightly distended and hyper-resonant. Dr. Fisher examined the patient under anaesthesia and found that the rectum communicated with the vagina through a small opening just above the *levator ani*. A catheter was passed through this fistula and the bowel was injected with lipiodol in olive oil.

Subsequent X ray examination showed an enormously dilated coil of descending colon occupying half the width of the abdomen and appearing to end 3.75 centimetres (one and a half inches) from the anal skin.

A plastic operation was performed by Dr. Fisher, an incision being made from the anal dimple to the coccyx. The median raphe of the *levator ani* was divided and the bowel was found and brought down and stitched to the skin. The posterior part of the perineal wound was packed with gauze and allowed to granulate.

The wound was slow in healing, owing to excessive granulation tissue formation. The bowel had remained attached to the skin. At the time of the meeting about half the faeces were being passed through the anus and half through the vaginal fistula. It was proposed eventually to close the latter.

Carcinoma of the Choanae.

Dr. Garnet Halloran showed a man, aged forty-eight years, who had complained of bilateral nasal obstruction. The left side had been obstructed for six months, the right side for three weeks only. He had suffered from frequent epistaxis and a purulent nasal discharge. Post-nasal examination revealed a proliferating tumour filling both choanae. Pathological examination of material removed for biopsy revealed carcinoma. On February 19, 1937, lateral rhinotomy was performed under endotracheal ether anaesthesia. The usual technique of this operation was followed, an incision being made in the left naso-

buccal fold. The tumour appeared to be growing from the vicinity of the left posterior ethmoidal cells across the median line and filling both choanae. It was removed piecemeal and its apparent base in the left posterior ethmoidal region was exenterated. Haemorrhage was severe at this stage. The skin incisions were completely closed. No radium was inserted at this time, as it was regarded as preferable to postpone radium insertion until the post-operative reaction within the nose had subsided. On March 12, 1937, under local anaesthesia, needles containing four milligrammes, with a filtration of 0.5 millimetre of platinum, were inserted within the choanae on each side. The needles were placed end to end, within fine rubber tubing, and, being attached to curved fine probes, were inserted through the nares to the roof of the choanae. They were removed seven days later. The usual post-radiation oedema occurred and remained for some weeks. Since then no trace of the original growth could be seen and the nasal airway was unobstructed.

Malignant Disease Treated by Radiation.

DR. PETER BRADDON showed a woman, aged seventy-nine years, who had been treated fourteen months previously for a carcinoma of the right side of the tongue, at the junction of the anterior and middle thirds. She had resolutely refused any form of operation and had been persuaded with great difficulty to submit to radium needling. She was given a dose of 6,000 r to the lesion on the side of the tongue, which was an ulcer 2.5 centimetres (one inch) in diameter, with heaped-up edges. Needles were also inserted vertically right down to the hyoid bone to give a dose approximating 6,000 r to the lymphatic area as far as the hyoid bone. She had a severe reaction, which subsided completely in two months. At the time of the meeting the tongue was mobile and free of ulceration and any sign of neoplasm, and there was no glandular enlargement. Dr. Braddon wondered if at her age (almost eighty years) she had not been wise in refusing a radical operation on glandular areas.

Dr. Braddon's second patient, aged sixty-seven years, had had a cicatrizing rodent ulcer of the chest for about thirty years. Much treatment had been employed without its nature's ever having been suspected. The lesion measured 10 by 11 centimetres and was almost square. Histological examination of biopsy material obtained from three different areas revealed basal-celled carcinoma in each instance. Treatment by a radium mould at one centimetre distance had been employed seven weeks before the meeting, 6,000 r having been delivered by 56 milligrammes in 168 hours. The radium was arranged according to physical laws, so that the dose was homogeneous over the whole area. The lesion cleared up promptly, all signs of growth having disappeared in less than three weeks, healing being evident in five weeks. At the time of the meeting there was no ulceration or growth; the skin was free over the sternum and ribs, the only sign of the recent radium treatment being a slight erythematous blush over the treated area. Dr. Braddon said that this case exemplified the fact that if dosage was accurate and homogeneous, bone and cartilage might with impunity be given the full epidermicidal dose (for either basal-celled carcinoma or epithelioma).

Dr. Braddon's third patient had had a rodent ulcer at the left angle of the mouth for thirty years. He had been subjected on various occasions elsewhere to treatment by diathermy, which on each occasion had made the lesion worse. The lesion was a very large un ulcerated cystic tumour at the left angle of the mouth, bulging extensively in the buccal aspect, and appearing to be on the point of breaking down in both aspects. It measured 4.5 by 3.5 centimetres. The lesion was treated interstitially by 6,400 r. A severe reaction followed, taking just over two months to settle down; the growth, however, completely disappeared in three weeks. At the time of the meeting there was full mobility of the mouth and cheek, there was practically no scarring, and the skin surface was perfect.

Dr. Braddon showed many other patients who had been similarly treated.

Acute Mastoiditis and Facial Paralysis.

DR. ASHLEIGH DAVY showed a female patient, aged seventeen years, whom he had first seen on March 24, 1937. At that time she had suffered from pain in the left ear for three weeks. Paracentesis had been performed seventeen days previously and the ear had been discharging until three days previously. There had been paralysis of the left facial nerve since the cessation of the discharge. There had been no fever. Pain had necessitated the frequent administration of aspirin, phenacetin and caffeine.

The left eardrum was thickened and injected; but there was no perforation, nor was there any pus in the meatus. The temperature was 37.2° C. (99° F.) and the pulse rate 92 per minute. There was complete left facial paralysis. There was tenderness over the antrum and tip of the left mastoid process and there was some oedema over the tip. There was pronounced left middle-ear deafness. The left mastoid process was opened up and packed on the same day; the drum was not incised.

On April 2, 1937, the left facial muscles did not respond to faradic stimulation; the wound was healthy; the upper three-quarters of the wound were sutured; a tube was left in the lower end.

On April 3 there was no voluntary facial movement; but there was a faint response to faradic stimulation.

On April 5, 1937, slight voluntary movements of the lower left facial muscles were possible.

Faradic stimulation and massage were employed for the following ten days, and the facial movements improved greatly. At the time of the meeting the wound was firmly healed and the facial movements and hearing were normal.

(To be continued.)

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the Queensland Branch of the British Medical Association:

Fitzgerald, Leo Joseph, M.B., B.S., 1933 (Univ. Melbourne), Howard.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Jakins, William Barton, M.B., 1935 (Univ. Sydney), c.o. Dr. A. L. Caselberg, Corrimal.

Post-Graduate Work.

WEEK-END COURSE AT PARRAMATTA.

THE New South Wales Post-Graduate Committee in Medicine, the University of Sydney, in conjunction with the Central Western Medical Association, will hold a week-end course at Parramatta on Saturday, October 23, and Sunday, October 24, 1937. The programme is as follows.

Saturday, October 23.

2.30 to 3.30 p.m.—"Toxemia of Pregnancy", Dr. A. J. Gibson.

3.30 to 4 p.m.—Afternoon tea.

4 to 5 p.m.—"Some of the Commoner Glandular Deficiencies in Practice", Dr. Allan Walker.

Sunday, October 24.

- 10 to 11 a.m.—"Treatment of Disproportion", Dr. A. J. Gibson.
 11 to 11.30 a.m.—Morning tea.
 11.30 a.m. to 12.30 p.m.—"The Management of Cardiac Failure" (with illustrative cases, if possible), Dr. Allan Walker.
 2 to 3 p.m.—"Uterine Inertia", Dr. A. J. Gibson.
 3 to 4 p.m.—"Some Points in the Treatment of Chronic Rheumatic Disease" (with illustrative cases, if possible), Dr. Allan Walker.
 4 to 4.30 p.m.—Afternoon tea.

The fee for the course will be one guinea. Those intending to be present are requested to notify Dr. K. S. Brown, "Brislington", 12, George Street, Parramatta, as soon as possible.

WEEK-END COURSE AT BATHURST.

THE New South Wales Post-Graduate Committee in Medicine, the University of Sydney, in conjunction with the Western Medical Association, will hold a week-end course at Bathurst on Saturday, October 23, and Sunday, October 24, 1937. The programme is as follows.

Saturday, October 23.

At the Council Chambers.

- 3.30 p.m.—Afternoon tea.
 4 p.m.—"Some Surgical Conditions of the Large Bowel", Dr. George Bell. "Medical Conditions of the Large Bowel", Dr. Kenneth Noad. Discussion.
 6.30 p.m.—Dinner at the Royal Hotel. Inspection of asparagus cannery.

Sunday, October 24.

At the Council Chambers.

- 9.30 a.m.—"The Efficacy of Some New Drugs, for example, Mandelic Acid, 'Prontosil', 'Cardiazol', 'Campolon' et cetera", Dr. Kenneth Noad. Discussion.
 10.15 a.m.—"Surgery of the Gall-Bladder and Bile Ducts", Dr. George Bell. Discussion.
 11.15 a.m.—Morning tea.
 11.30 a.m.—"The Diagnosis of Poliomyelitis from the General Practitioner's Point of View", Dr. Kenneth Noad. Discussion.
 1 p.m.—Luncheon.
 2 p.m.—"Abdominal Emergencies", Dr. George Bell.
 2.45 p.m.—"A Simple Technique of Blood Transfusion", Dr. George Bell. Discussion.
 3 p.m.—"An Improved Thomas Splint Suitable for Ambulance Transport", Dr. B. Moore. Discussion.
 4 p.m.—Afternoon tea.
 4.30 p.m.—General discussion.

The fee for the course will be one guinea. Those intending to be present are requested to notify Dr. S. R. Dawes, P.O. Box 123, Orange, as soon as possible.

Correspondence.

THE ACTION OF MYDRIATICS.

SIR: It is generally understood that mydriatics dropped into the conjunctiva pass in minute quantity through the centre of the cornea and reach the iris in infinitesimal quantity. It is known that pieces of iris dropped into a solution of atropine sulphate, one part in 50 millions, are affected. Experimental evidence shows that in some animals' eyes the cornea freely transmits salts, chiefly chlorides, from without in so long as the cornea is living. A subconjunctival injection, however, of five minims of a solution consisting of one minim of atropine sulphate

2% and four minims of adrenaline (1 in 1,000) causes maximal dilatation of the pupil, almost immediately. Can anyone suggest how such effect is brought about? If the solution reached the lenticular ganglion it might well affect the other side, but the action is strictly one-sided and sometimes almost instantaneous.

Yours, etc.,

103-105, Collins Street,
Melbourne, C.I.,
September 21, 1937.

JAMES W. BARRETT.

Obituary.

JOHN BESLEY GILLEN.

DR. KEVIN BYRNE writes the following appreciation of the late Dr. John Besley Gillen.

The cabled report of the death of John Besley Gillen in London was published on September 11, 1937. Gillen was a good Australian. He was born at Alice Springs, Central Australia, and was the son of Gillen whose trans-Australian explorations are recorded in the book by Professor Baldwin Spencer and Gillen. John Gillen was a short man of dynamic vivacity. He had unusually bright eyes, which could register keen intelligence, flashing humour and, better still, deep sympathy for those who needed it. He was well read and possessed an inquisitiveness probably inherited from his explorer father. He had a respect for his juniors and seniors, coupled with a delightful independence which made him say what he thought to anyone, irrespective of position. Gillen was a good shipmate, well thought of by all who sailed with him in the Royal Australian Navy. After demobilization he became a successful practitioner in Gawler, South Australia.

He ceased practice with the intention of specializing as an alienist. Two days after his death I received a letter from him, dated August 6, 1937, from England, where he had been gaining experience and a diploma in psychological medicine. The following extract will be of interest: "The teaching of neurology here is extraordinarily good . . . psychological medicine is the vogue over here at the moment, and child guidance is well in the foreground and I think has come to stay. This place is the most modern of the L.C.C. mental hospitals, and they are, by the way, no longer called mental hospitals, but hospitals for nervous disorder. Most of the patients here are on a voluntary basis and can leave on giving seventy-two hours' notice. The patients are safeguarded in every way, and high standard of efficiency is demanded of the medical staff . . . Have seen a lot of G.P.I. . . . treatment in the country is wholly malarial and in early cases is most successful . . ."

It will be a sad passage home for his wife, who accompanied him to England. A daughter and son also mourn.

Books Received.

THE DOCTOR AND THE PUBLIC: A STUDY OF THE SOCIOLOGY, ECONOMICS, ETHICS, AND PHILOSOPHY OF MEDICINE, BASED ON MEDICAL HISTORY, by J. P. Warbasse, M.D.; 1937. New York: Paul B. Hoeber Incorporated; Australia: Angus and Robertson Limited. Medium 8vo, pp. 591, with illustrations. Price: 30s. net.

CLINICAL URINALYSIS AND ITS INTERPRETATION, by R. A. Kilduffe, A.M. M.D., F.A.S.C.P.; 1937. Philadelphia: F. A. Davis Company. Demy 8vo, pp. 435, with 40 illustrations. Price: \$4.00 net.

INJECTION TREATMENT OF HERNIA, by C. O. Rice, M.D., F.A.C.S., with the assistance and cooperation of H. Mattson, M.D.; 1937. Philadelphia: F. A. Davis Company. Demy 8vo, pp. 275, with 83 illustrations. Price: \$4.50 net.

A MANUAL OF PRACTICAL TROPICAL SANITATION, by J. Balfour Kirk, M.B., Ch.B., M.R.C.P., D.P.H., D.T.M. and H.; 1937. London: Baillière, Tindall and Cox. Large crown 8vo, pp. 311, with illustrations. Price: 7s. 6d. net.

PROTOFORMOTHERAPY IN TREATMENT AND PREVENTION. FIFTEEN YEARS OF RESEARCH ON NEW SCIENTIFIC BASES OF THERAPEUTICS, by N. E. Ischlondsky; 1937. London: Henry Kimpton. Royal 8vo, pp. 261, with illustrations. Price: 21s. net.

TREATMENT OF SOME CHRONIC AND "INCURABLE" DISEASES, by A. T. Todd, O.B.E., M.B., M.R.C.P.; 1937. Bristol: John Wright and Sons Limited; London: Simpkin Marshall Limited. Demy 8vo, pp. 211. Price: 10s. net.

MEDICAL EMERGENCIES, by C. Newman, M.D., F.R.C.P.; Second Edition; 1937. London: J. and A. Churchill Limited. Large crown 8vo, pp. 160. Price: 8s. 6d. net.

LEAGUE OF NATIONS PUBLICATIONS. ANNUAL REPORT ON THE RESULTS OF RADIOTHERAPY IN CANCER OF THE UTERINE CERVIX. FIRST VOLUME: STATEMENTS OF RESULTS OBTAINED IN 1930 AND PREVIOUS YEARS, edited by J. Heyman, M.D.; 1937. Geneva: Publications Department of the League of Nations. Royal 8vo, pp. 74. Price: 2s. 6d. net.

RECENT ADVANCES IN THE STUDY OF RHEUMATISM, by F. J. Poynton, M.D., F.R.C.P., and B. Schlesinger, M.A., M.D., F.R.C.P.; Second Edition; 1937. London: J. and A. Churchill Limited. Large crown 8vo, pp. 390, with 51 illustrations. Price: 15s. net.

MODERN TREATMENT IN GENERAL PRACTICE. VOLUME III, edited by C. P. G. Wakeley, D.Sc., F.R.C.S., F.R.S.E.; 1937. London: The Medical Press and Circular. Demy 8vo, pp. 448, with illustrations. Price: 10s. 6d. net.

HAND-BOOK OF TREATMENT, by E. A. Mullen, M.D., F.A.C.S., with a foreword by H. C. Wood, Junior; 1937. Philadelphia: F. A. Davis Company; Australia: Angus and Robertson Limited. Demy 8vo, pp. 707. Price: 30s. net.

THE ART OF SURGERY. A TEXT-BOOK FOR STUDENTS AND PRACTITIONERS, by H. S. Souttar, D.M., M.Ch., F.R.C.S.; Third Edition; 1937. London: William Heinemann (Medical Books) Limited. Imperial 8vo, pp. 640, with illustrations. Price: 30s. net.

PHYSICIAN, PASTOR AND PATIENT. PROBLEMS IN PASTORAL MEDICINE, by G. W. Jacoby, M.D.; 1937. New York: Paul B. Hoeber Incorporated; Australia: Angus and Robertson Limited. Demy 8vo, pp. 399, with illustrations. Price: 21s. net.

Diary for the Month.

- OCT. 5.—New South Wales Branch, B.M.A.: Council (Quarterly).
 OCT. 6.—Victorian Branch, B.M.A.: Branch.
 OCT. 6.—Western Australian Branch, B.M.A.: Council.
 OCT. 7.—South Australian Branch, B.M.A.: Council.
 OCT. 7.—Tasmanian Branch, B.M.A.: Council.
 OCT. 8.—Queensland Branch, B.M.A.: Council.
 OCT. 12.—New South Wales Branch, B.M.A.: Organization and Science Committee.
 OCT. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
 OCT. 14.—Tasmanian Branch, B.M.A.: Branch.
 OCT. 19.—New South Wales Branch, B.M.A.: Ethics Committee.
 OCT. 20.—Western Australian Branch, B.M.A.: Branch.
 OCT. 21.—New South Wales Branch, B.M.A.: Clinical Meeting.
 OCT. 21.—Tasmanian Branch, B.M.A.: Council.
 OCT. 22.—Queensland Branch, B.M.A.: Council.
 OCT. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 OCT. 27.—Victorian Branch, B.M.A.: Council.
 OCT. 28.—New South Wales Branch, B.M.A.: Branch.
 OCT. 28.—South Australian Branch, B.M.A.: Branch.
 NOV. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
 NOV. 2.—Tasmanian Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," pages xxiv to xxvi.

- AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Honorary Officers.
 BUNDABERG HOSPITALS BOARD, BUNDABERG, QUEENSLAND: Assistant Resident Medical Officer.
 CITY OF BENDIGO, VICTORIA: Medical Officer of Health.
 DUMBLEYUNG HOSPITAL BOARD, DUMBLEYUNG, WESTERN AUSTRALIA: Medical Officer.
 REPATRIATION COMMISSION, PERTH, WESTERN AUSTRALIA: Medical Officer.
 TAMBO HOSPITALS BOARD, TAMBO, QUEENSLAND: Medical Superintendent.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135 Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmuir United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 175 North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

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